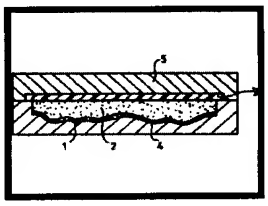
Derwent Record



Derwent Title: **Relief image, e.g. for map or picture - has filling of plastic foam to support moulded plastic covering layer**

Original Title: FR2754928A1: CARTE OU IMAGE EN RELIEF

Assignee: **FARACHE R** Individual

Inventor: **None**

Accession/ Update: **1998-253417 / 199823**

IPC Code: **G09B 29/12** ; G09B 25/06 ;

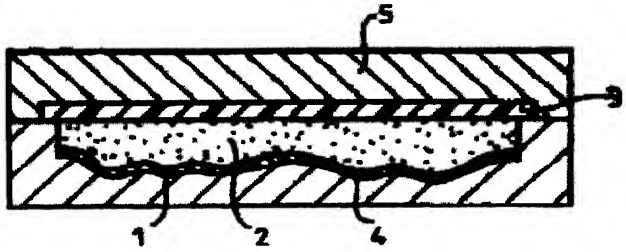
Derwent Classes: A97; P85;

Manual Codes: **A12-F**(Fancy goods, games, sports equipment, toys [others]) , **A12-S04**(Expanded polymers or general [exc. polystyrene, polyurethane])

Derwent Abstract: (FR2754928A) A relief image consists of a thin covering layer (3) made from a plastic sheet, moulded on an engraved matrix to produce the required shape, a flat plastic backing layer (1) and a cellular foam filling. The moulded plastic sheet and flat backing layer are made from a plastic selected from the group comprising PVC, high and low density polyethylenes, polyamides, polystyrenes and polyacrylics. The cellular foam filling is made from a supple polyurethane, polystyrene or PVC foam, or from expanded latex rubber. The different components of the image are stuck together using adhesives, compatible plastic materials with suitable cohesion, or by thermal welding of their edges.

Advantage - The plastic foam filling provides support for a finely-moulded covering layer, preventing fragility.

Images:



Dwg.2/2

Family:

PDF	Patent	Pub. Date	Derwent Update	Pages	Language	IPC Code
☑	FR2754928A1 *	1998-04-24	199823	8	French	G09B 29/12

Local appls.: FR1996000012890 Filed:1996-10-23 (96FR-0012890)

Priority Number:

Application Number	Filed	Original Title
FR1996000012890	1996-10-23	

Extended Polymer Index: Show extended polymer index

Related Accessions:

Accession Number	Type	Derwent	Derwent Title

		Update	
C1998-078980	C		
N1998-200227	N		
2 items found			

Title Terms: RELIEF IMAGE MAP PICTURE FILL PLASTIC FOAM SUPPORT MOULD PLASTIC COVER LAYER

Pricing Current charges

Derwent Searches: Boolean | Accession/Number | Advanced

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(12) DEMANDE DE BREVET D'INVENTION A1

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(60) **Références à d'autres documents nationaux apparentés :**

(71) **Demandeur(s)** : *FARACHE ROGER* — HK.

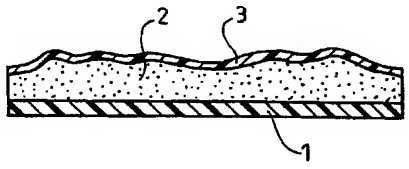
(72) **Inventeur(s)** :

(73) **Titulaire(s)** : .

(74) **Mandataire** : CABINET PEUSCET.

(54) CARTE OU IMAGE EN RELIEF.

(57) L'invention concerne un support en relief pour représentation graphique comportant une feuille frontale (3) mince en matière plastique munie, sur une de ses faces, des reliefs désirés et, sur son autre face, des creux correspondant auxdits reliefs, caractérisé par le fait qu'il comporte une feuille d'endos sensiblement plane (1) réalisée en matière plastique et une couche de mousse cellulaire (2) disposée entre ladite feuille d'endos (1) et la feuille frontale (3) portant les reliefs, ladite couche de mousse cellulaire (2) épousant sur une de ses faces les creux correspondant aux reliefs de la feuille frontale et étant sensiblement plane sur son autre surface.



FR 2 754 928 - A1

CARTE OU IMAGE EN RELIEF

La présente invention concerne un support en relief de représentation graphique, tel qu'une carte ou image en relief.

Il est connu de préparer des cartes ou images en relief, par exemple des cartes géographiques en relief. Généralement, on prépare ces cartes ou images par déformation à chaud d'une feuille de matière plastique thermoplastique dans un moule. On obtient donc une feuille ayant, sur une face, en saillie, le relief désiré et, sur l'autre face, ce même relief en creux. De façon à obtenir un relief fin et précis, on déforme généralement des feuilles minces : dans ce cas, la carte ou image est fragile et risque, par exemple lors d'un choc, de se déformer de façon permanente ou de se fendre. Pour éviter cet inconvénient, on pourrait penser à préparer par moulage des cartes ou images constituant un support épais réalisé en une seule pièce et ayant une surface en relief, la face opposée étant plane : mais, dans ces conditions, lorsque ces supports ont une relativement grande surface, ils sont lourds et difficiles à manipuler.

La présente invention permet d'obtenir des cartes ou images qui soient à la fois résistantes et légères, donc faciles à manipuler.

La présente invention a pour objet un support en relief pour représentation graphique comportant une feuille frontale mince en matière plastique munie, sur une de ses faces, des reliefs désirés et, sur son autre face, des creux correspondant auxdits reliefs, caractérisé par le fait qu'il comporte une feuille d'endos sensiblement plane réalisée en matière plastique et une couche de mousse cellulaire disposée entre ladite feuille d'endos et la feuille frontale portant les reliefs, ladite couche de mousse cellulaire épousant sur une de ses faces les creux correspondant aux reliefs de la feuille frontale et étant sensiblement plane sur son autre surface.

L'utilisation de la mousse cellulaire permet d'alléger la carte ou image. La mousse cellulaire utilisée est, de préférence, une mousse flexible. De cette façon, elle absorbe les chocs qui peuvent être appliqués sur la feuille de matière plastique en relief ; elle permet également, si le relief a été déformé sous le choc, de l'aider à revenir à sa forme initiale. Et enfin, la mousse constitue un renfort souple

derrière la feuille frontale, ce qui permet d'utiliser comme feuille frontale une pellicule très fine sans risque de détérioration de celle-ci à l'usage : on améliore ainsi la précision des reliefs matricés à chaud sur la feuille frontale.

La feuille frontale munie d'une surface en relief peut être préparée en toute matière plastique thermoplastique ou thermodurcissable : il suffit qu'elle puisse être mise en forme par déformation à chaud au moyen d'une matrice gravée. Elle est, de préférence, préparée à partir d'une feuille de matière plastique thermoplastique, avantageusement choisie dans le groupe formé par le poly(chlorure de vinyle), les polyéthylènes haute et basse densité, les polyamides, les polystyrènes et les polyacryliques.

De même, la feuille d'endos sensiblement plane peut être réalisée en toute matière convenable selon l'usage prévu. Elle peut être une simple feuille de papier ou de carton. Elle peut être en toute matière thermoplastique ou thermodurcissable ; les matières thermoplastiques utilisées sont, avantageusement, choisies dans le même groupe que pour la réalisation de la feuille frontale. Pour des raisons économiques, on choisit, de préférence, la même matière plastique pour la feuille d'endos et pour la feuille frontale.

De façon avantageuse, selon l'usage prévu, la feuille d'endos peut être munie d'une couche de colle et d'une feuille de protection pelable. Elle peut également être munie d'éléments magnétiques ou être fabriquée à partir d'une feuille de matière plastique contenant une poudre de matière magnétique.

La mousse cellulaire est, avantageusement, une mousse souple de polyuréthanne, de polystyrène ou de poly(chlorure de vinyle) ou un latex de caoutchouc expansé.

Selon un premier mode de réalisation, la couche de mousse cellulaire est fixée à la feuille frontale et/ou à la feuille d'endos par une couche de colle.

Selon un autre mode de réalisation, la couche de mousse cellulaire est fixée à la feuille frontale et/ou à la feuille d'endos en utilisant des matières plastiques compatibles susceptibles de cohésion à chaud.

Selon encore un autre mode de réalisation, la couche de mousse cellulaire a des dimentions plus faibles que la feuille d'endos et la feuille frontale et les bords de ces feuilles sont soudés entre eux par collage ou thermofusion, la couche de mousse n'étant pas fixée mais étant emprisonnée entre les deux feuilles. Ce mode de réalisation est avantageux dans le cas de cartes ou images de faible dimension.

La présente invention a également pour objet un procédé de fabrication du support en relief selon l'invention. Selon ce procédé :

1) dans un premier stade, on met en forme par matriçage à chaud une feuille mince de matière plastique, portant toute représentation graphique désirable, dans le fond d'un moule ayant le profil correspondant au relief désiré, ladite mise en forme étant obtenue par action d'une matrice mâle ayant un profil complémentaire à celui du moule et permettant de réaliser la feuille frontale du support ;

2) dans un second stade, on verse dans le moule contenant la feuille frontale ainsi obtenue, un mélange réactionnel contenant un agent d'expansion susceptible de générer une mousse cellulaire de matière plastique expansée ;

3) dans un troisième stade, on ferme le moule ainsi préparé avec un couvercle plan après avoir interposé entre le moule et son couvercle une feuille de matière plastique plane destinée à constituer la feuille d'endos du support et l'on maintient en place le couvercle pendant le développement de la mousse entre la feuille frontale et la feuille d'endos ;

4) dans un quatrième stade, on démoule le support.

Avantageusement, entre le premier stade et le second stade, la feuille frontale matricée est munie d'une couche de colle, et au troisième stade, on introduit une feuille d'endos pré-encollée.

Selon un autre procédé, on réalise le support selon l'invention par plusieurs injections successives.

Le dessin schématique annexé permettra de mieux comprendre l'invention.

Sur ce dessin :

- la figure 1 représente de façon schématique, en coupe transversale, un stade de la fabrication d'un support de carte selon l'invention ;

- la figure 2 représente, en coupe transversale, le support de carte obtenu.

On introduit dans le fond 4 d'un moule un film 3 de poly(chlorure de vinyle) préalablement imprimé pour y faire apparaître la représentation graphique d'une carte géographique. Le fond 4 a le profil désiré correspondant au relief voulu. On chauffe la feuille de poly(chlorure de vinyle) pour la ramollir et on la déforme à l'aide d'une matrice ayant un profil complémentaire de celui du fond du moule. On laisse refroidir, on dépose une couche de colle et on introduit dans le moule le mélange d'un précurseur de polyuréthanne et d'un agent d'expansion. La mousse commence à se développer. On ferme alors le moule avec un couvercle plan 5 en ayant interposé une feuille souple de poly(chlorure de vinyle) plane 1 enduite de colle que l'on maintient en place à l'aide du couvercle 5, sur lequel on exerce une pression pour assurer la fermeture du moule. Lorsque la mousse a fini de se développer, on démoule.

On obtient ainsi le produit représenté sur la figure 2, qui est constitué d'une feuille plane 1 de poly(chlorure de vinyle), d'une couche de mousse 2 et d'une feuille 3 munie d'une surface en relief et présentant la reproduction graphique désirée. Ce support est relativement souple et n'est pas fragile à la manipulation.

REVENDICATIONS

1 - Support en relief pour représentation graphique comportant une feuille frontale (3) mince en matière plastique munie, sur une de ses faces, des reliefs désirés et, sur son autre face, des creux correspondant auxdits reliefs, caractérisé par le fait qu'il comporte une feuille d'endos sensiblement plane (1) réalisée en matière plastique et une couche de mousse cellulaire (2) disposée entre ladite feuille d'endos (1) et la feuille frontale (3) portant les reliefs, ladite couche de mousse cellulaire (2) épousant sur une de ses faces les creux correspondant aux reliefs de la feuille frontale et étant sensiblement plane sur son autre surface.

2 - Support selon la revendication 1, caractérisé par le fait que la feuille frontale (3) et/ou la feuille d'endos (1) est (sont) en matière thermoplastique.

3 - Support selon la revendication 2, caractérisé par le fait que la matière plastique des feuilles frontale et d'endos est choisie dans le groupe formé par le poly(chlorure de vinyle), les polyéthylènes haute et basse densité, les polyamides, les polystyrènes et les polyacryliques.

4 - Support selon l'une des revendications 1 à 3, caractérisé par le fait que la mousse cellulaire (2) est une mousse souple de polyuréthanne, de polystyrène ou de poly(chlorure de vinyle) ou de latex de caoutchouc expansé.

5 - Support selon l'une des revendications 1 à 4, caractérisé par le fait que la feuille frontale (3), la couche de mousse (2) et la feuille d'endos (1) sont fixées ensemble par collage.

6 - Support selon l'une des revendications 1 à 4, caractérisé par le fait que la feuille frontale (3), la couche de mousse (2) et la feuille d'endos (1) sont fixées ensemble en utilisant des matières plastiques compatibles susceptibles de cohésion.

7 - Support selon l'une des revendications 1 à 4, caractérisé par le fait que la feuille frontale (3) et la feuille d'endos (1) sont fixées ensemble sur leurs bords par thermofusion.

8 - Procédé de fabrication d'un support en relief selon l'une des revendications 1 à 7, caractérisé par le fait que :

1) dans un premier stade, on met en forme par matriçage à chaud une feuille mince de matière plastique, portant toute

représentation graphique désirable, dans le fond d'un moule ayant le profil correspondant au relief désiré, ladite mise en forme étant obtenue par action d'une matrice mâle ayant un profil complémentaire à celui du moule et permettant de réaliser la feuille frontale du support ;

2) dans un second stade, on verse dans le moule contenant la feuille frontale ainsi obtenue, un mélange réactionnel contenant un agent d'expansion susceptible de générer une mousse cellulaire de matière plastique expansée ;

3) dans un troisième stade, on ferme le moule ainsi préparé avec un couvercle plan après avoir interposé entre le moule et son couvercle une feuille de matière plastique plane destinée à constituer la feuille d'endos du support et l'on maintient en place le couvercle pendant le développement de la mousse entre la feuille frontale et la feuille d'endos ;

4) dans un quatrième stade, on démoule le support.

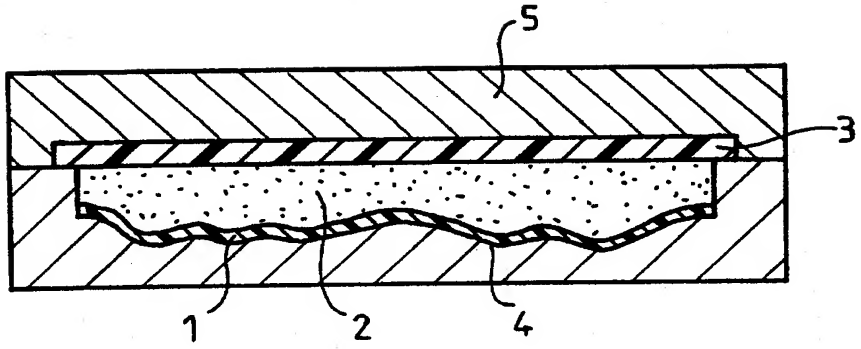


FIG.1

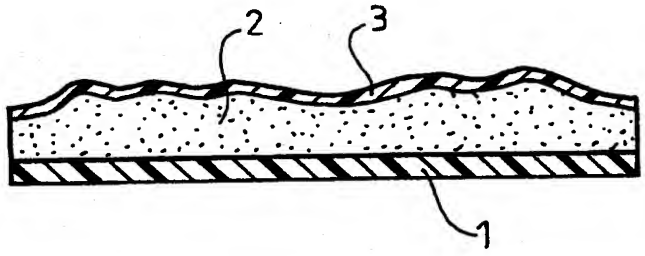


FIG.2

83-791356/42 A82 G02 (A18 A86) KAWA/ 04.03.82
KAWASHIMA K *J5 8151-366-A
04.03.82-JP-034840 (08.09.83) C04b-33/36

Preservation of modelled body made of plasticine - by coating with latex or soln. of organic high mol. wt. polymer opt. contg. polymerisable monomer, and hardening film

C83-100595

A solvent soln. or latex of an organic high polymer and/or a polymerisable cpd. is coated on the surface of a model made of plasticine, to form a covering film of an organic polymer on that surface.

The organic high polymer is transparent plastics.

The polymerizable cpd. is a vinyl monomer, a monomer which polymerises by ring-opening, a polycondensable cpd or a prepolymer of these cpds.

The latex is an emulsion polymsn. latex of a n elastomer or plastics.

The plasticine contains corn powder.

USE/ADVANTAGE

The plasticine model can be preserved for a long period and its deformation, cracking, discolouration, etc. are prevented.

MATERIALS

The high polymer is e.g. a plastics (e.g. polymethacrylate, polyethylene, polypropylene, PVA, polyvinyl acetate, polystyrene) or an elastomer (e.g. natural rubber, styrene-butadiene rubber).

The polymerisable cpd. is e.g. vinylchloride, methyl methacrylate, vinylacetate, styrene, (meth)acrylic acid, THF, trioxane, precursors of unsatd polyester resin or an epoxy resin.

The solvent is e.g. (m)ethyl alcohol, acetone, methyl-ethyl ketone or water.

The plasticine is composed e.g. of 100 pts (wt) wheat flour, 20 pts water, 10 pts. ethylene glycol and 5 pts. salad oil.(4ppW170PADwgNo0/1).

A(11-B5, 12-B8, 12-F) G(2-A5)

J58151366-A

⑲ 日本国特許庁（JP）　　⑪ 特許出願公開

⑫ 公開特許公報（A）　　昭58—151366

⑤Int. Cl.³	識別記号	庁内整理番号	⑬公開 昭和58年(1983)9月8日
C 04 B 33/36		7351—4G	

発明の数 1
審査請求 未請求

（全 4 頁）

⑭粘土造形品の保存方法

⑳特　　願 昭57—34840
㉒出　　願 昭57(1982)3月4日
㉒発 明 者 川嶋清治
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㉔代 理 人 弁理士 苗村正

明　細　書

1. 発明の名称　粘土造形品の保存方法

2. 特許請求の範囲

(1) 有機高分子物質及び／又は重合性化合物の溶液又はラテックスを粘土造形品の表面に塗付し、前記重合性化合物の重合反応及び／又は溶剤の蒸発除去によつて前記粘土造形品の表面を前記有機高分子物質の膜で被覆することを特徴とする粘土造形品の保存方法。

(2) 有機高分子物質は透明なプラスチックスである特許請求の範囲第1項記載の方法。

(3) 重合性化合物はビニル単量体、開環重合性単量体、縮重合性化合物又はこれらの重合度の低いプレポリマーである特許請求の範囲第1項記載の方法。

(4) ラテックスはエラストマー又はプラスチックスの乳化重合ラテックスである特許請求の範囲第1項乃至第3項記載の方法。

(5) 粘土は鉱物粘土である特許請求の範囲第1項乃至第4項記載の方法。

3. 発明の詳細な説明

本発明は粘土造形品の表面を有機高分子物質の膜で被覆することにより粘土中の揮発成分の蒸発による亀くずれ及び亀裂発生、ほこりの付着更に退色を防止し、粘土造形品の当初の形状、外観色彩を損なうことなく長期間保存する方法に関する。

一般に粘土は子供用玩具、学校教材用として多用されており、この粘土を用いて種々の形状、色彩の造形品を作成する。そこでこれらの粘土造形品を将来の記念としてそのままの形状、外観で長期保存したいという要請がでている。ここで粘土は通常数個な含水ケイ酸あるいは鉱物粉に適量の水を混入して練り合せて調製されるが、この粘土を長時間放置すると水分が蒸発して亀くずれ、亀裂が発生し、更に着色粘度のばあいは退色、変色する為、実用長期間の保存に耐えうるものではない。

本発明は上記問題点を解決し粘土造形品の当初の形状、外観、色彩を損なうことなく長期保存する粘土造形品の保存方法を提供するものである。

本発明の方法は有機高分子物質及び／又は重合性化合物の溶液又はラテックスを粘土造形品の表面に塗付し、前記重合性化合物の重合反応及び／又は溶剤の蒸発除去によつて前記粘土造形品の表面を前記有機高分子物質の膜で被覆することを特徴とする。

本発明で用いられる有機高分子物質とはプラスチックス、例えばポリメチルメタクリレート、ポリエチレン、ポリプロピレン、ポリビニルアルコール、ポリ酢酸ビニル、ポリスチレン、エチレンと不飽和カルボン酸共重合体の金属塩架橋物（所謂アイオノマー）、ポリ塩化ビニル等、あるいはエラストマー、例えば天然ゴム、スチレン、ブタジエンゴム、ブチルゴム、ブタジエンゴム等で有機又は無機溶剤に溶解性の高分子である。

また本発明で用いられる重合性化合物とは例えば、塩化ビニル、メチルメタクリレート、酢酸ビニル、スチレン、メタクリル酸、アクリル酸、アクリロニトリル等のビニル単量体、テトラヒドロフラン、トリオキサン、ラクタム、ラクタム等の開環重合性単量体のほかアルキッド樹脂、不飽和ポリエステル樹脂、ポリカーボネート樹脂、エポキシ樹脂等のポリ縮合系のプラスチックスを形成する出発物質、フェノール・ホルマリン樹脂、尿素・ホルマリン樹脂、メラミン・ホルマリン樹脂、ポリウレタン等の付加縮合系のプラスチックスを形成する出発物質をいうが、更にはこれらが部分的に重合反応した所謂プレポリマーをも包含する。

本発明の方法では前記有機高分子物質又は前記重合性化合物あるいはこれらの混合物を適宜溶剤に溶解させて溶液状態とする。ここで溶液にする場合、有機高分子物質を溶剤で溶解する場合、有機高分子物質と重合性化合物の混合物を溶剤で溶解される場合、重合性化合物を溶剤で溶解させる場合、有機高分子物質を重合性化合物で溶解させる場合、重合性化合物単独の場合の態様があるが、重合性化合物を用いる場合は重合反応を起こす為の触媒の添加及び加熱等による重合反応の制御の必要があり、溶液状態としても重合活性であるため保存が困難である等の欠点があり、したがつて有機高分子物質を有機溶剤に溶解した溶液を使用することがより望ましい。

本発明で使用される溶剤はアルコール類、ケトン類、エステル類、脂肪族炭化水素、芳香族炭化水素、水、酸性水溶液、塩基性水溶液などの有機又は無機溶剤で、特に低沸点で人体に害のないもの、例えばエチルアルコール、メチルアルコール、アセトン、メチルエチルケトン、水が望ましく、とくに水、エチルアルコールが子供等の安全性の見地から好適に採用できる。

前記高分子物質等を溶解した溶液は溶剤を乾燥除去した後、所定の厚さの高分子物質の被覆膜を形成するように濃度を適宜調整する必要があり、通常5～50重量％の範囲の濃度に調整する。

本発明では前記有機高分子物質又は反応性化合物のラテックスも使用できる。ここでラテックスとは水中に有機高分子物質等の粒子が均一に分散しており乳化剤（主として界面活性剤）によつて安定化されているものをいう。ラテックスはビニル単量体の乳化重合あるいは高分子溶液を乳化剤を含む水溶液中に分散することにより調製される。ラテックスは固形分50重量％以下のものが通常使用される。

そこでこの有機高分子物質の溶液又はラテックスを粘土造形品の表面に塗付するには該溶液を入れた容器に前記粘土造形品を浸漬するか、あるいは前記溶液をスプレーで前記粘土造形品に吹き付けるか、更には前記溶液を刷毛で前記粘土造形品に塗り付ける方法等を採用することができる。なお溶剤の乾燥は自然乾燥あるいは熱風乾燥等で行なうことができる。

なお重合性化合物を用いる場合、重合開始剤、例えば過酸化物、酸触媒、アルカリ触媒の少量添加が必要であり、重合反応はこれを所定温度（例えば30°C～100°C）に加熱あるいは常温で放置することにより行なう。

有機高分子物質の膜の厚さは溶液濃度を調整することにより可能であるが、更に溶液を数回にわたり塗付することにより調整することができる。なおこの高分子物質の種類及び溶剤の種類は使用

する粘土の材質との関連で適定されなければならない。本発明で用いられる粘土は微細な含水ケイ酸塩を適当量の水と混合して練り合せてなる所謂無機粘土、小麦粉、コメ粉、馬鈴薯粉、トウモロコシ粉等を適当量の水と混合、練り合してなる所謂鉱物●粘土、エラストマー成分の一種類又は2種類以上を混合してなるゴム粘土、プラスチックスに所定の可塑剤等を混入してなるプラスチックス粘土あるいは紙粘土等である。例えば無機粘土あるいは鉱物●粘土のように水を包含する粘土に対しては前記溶剤、例えばエタノール、アセトン等水との親和性の高いものを使用することが均一な厚さの被覆膜を形成するうえで望ましい。一方ゴム粘土、プラスチックス粘土のように有機溶剤に溶解しやすいものに対しては上記ゴム成分又はプラスチックス成分を溶解しないが、溶解し難い溶剤、例えばエタノール、水等を選定することが望ましい。更に被覆膜に使用する有機高分子物質は無機粘土あるいは鉱物粘土に使用する場合、水に溶解しないものであることが必要である。これは粘土内部の水分が表面の被覆膜の高分子物質を溶解してしまうことによる。したがってこの場合水溶解性の高分子物質の被覆膜を形成し、その上に更に別種の高分子物質の被覆膜を形成することも可能である。尚この高分子物質の被覆膜は粘土が着色している場合、その色彩を保つ為透明になるように材料を選定することが望ましく、例えばメチルメタクリレート、アクリロニトリル等が使用される。更に被覆膜は柔軟性を必要とする場合、エラストマー材を選定することができ、あるいは粘土造形品の型くずれを主目的とする強度維持には剛直なプラスチックスを選定することができる。

なお本発明の方法の適用例として第1図に示す如く、着色した●●粘土(2)と有機高分子物質を有機溶剤に溶解した溶液●●●(3)を組み合せてセットケース(1)として商品化することができる。

依して本発明の方法では柔軟なエラストマーあるいは硬いプラスチックス等により粘土造形品の表面に被覆膜を形成するため粘土内部から水分等が蒸発することなく亀くずれ、亀裂が生じるのを防止し、更にはプラスチックス独特の光沢及び強度を付与し、しかも粘土の色彩の退色防止、汚染防止等の効果があり長期間の保存の為に極めて効果的である。

実施例1

次の組成の鉱物粘土組成物を調整した。

組成物(A)

小麦粉(強力粉)	100部
水	20部
エチレングリコール	10部
サラダ油	5部

上記鉱物粘土で造形品を作成し、その表面に天然ゴムラテックス(組成:水60%、ゴム35%タンパク、セッケン、脂肪酸、ステロール、5%以下)を塗付し自然乾燥して天然ゴムの薄膜を前記造形品表面に形成したところ、粘土の色彩に変色はなく、しかも表面に光沢がでた。

実施例2

実施例1と同じ組成の粘土の造形品の表面にポリメチルメタクリレートをアセトン中に濃度10重量%で溶解させたものを塗付し、アセトンを自然乾燥させた。造形品表面には透明で硬い被覆膜が形成され造形品の強度は高く変形し難くなつた。

実施例3

実施例1と同じ組成を有する粘土の造形品の表面にポリメチルメタクリレートをメチルメタクリレート単量体中に20重量%で溶解し、これに微少の過酸化物を添加したものを塗付し室温(25°C)で放置したが、約10時間後に前記メチルメタクリレートの重合反応が終了し実施例2と実質的に同じものが得られた。

4. 図面の簡単な説明

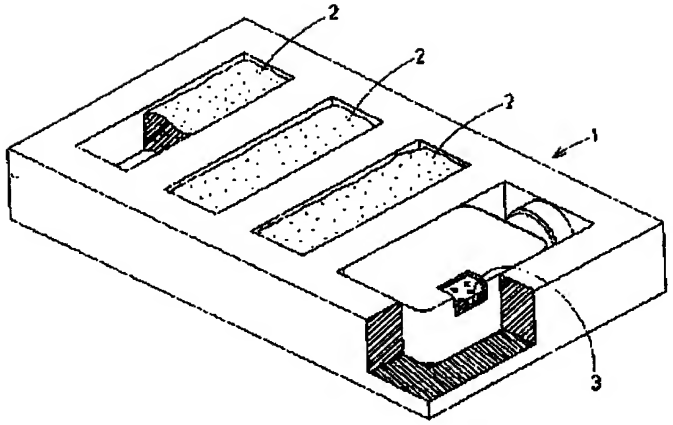
第1図は本発明の方法の適用例を示す概略図である。

1…粘土と被覆膜を形成する溶液との組合せセットケース

2…粘土

3…被覆膜を形成する溶液

第 1 図



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(51) INT CL[5]
A63H 33/42

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A6S S22D

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None

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INT CL[4] A63H

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(54) Diorama toy kit

(57) A miniature toy kit includes a three-dimensional diorama scene 13, figures positionable on the scene and a case which functions both as a supporting field for the toy and a storage and carrying case for both diorama and figures, figure 3. The diorama scene is formed of an elastic and memory-retaining material such as latex so that the same may be compressed into the case for storage but springs back to its original three-dimensional form when the case is opened. Different dioramas can be substituted and numbers of kits can be connected in modular fashion. When stored in the case, the figures are safely held against movement and possible injury.

FIG 3

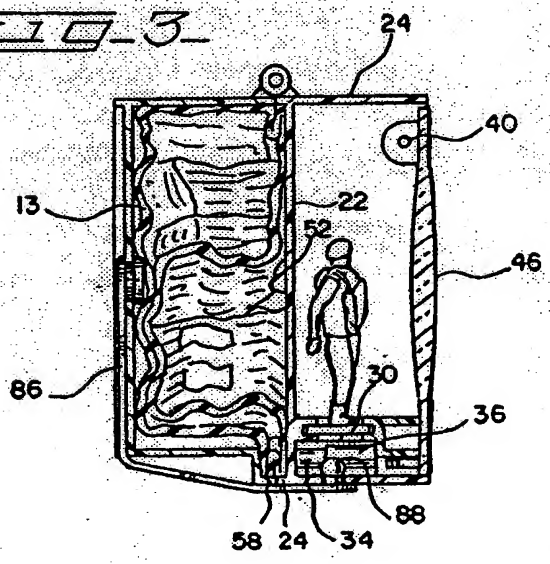
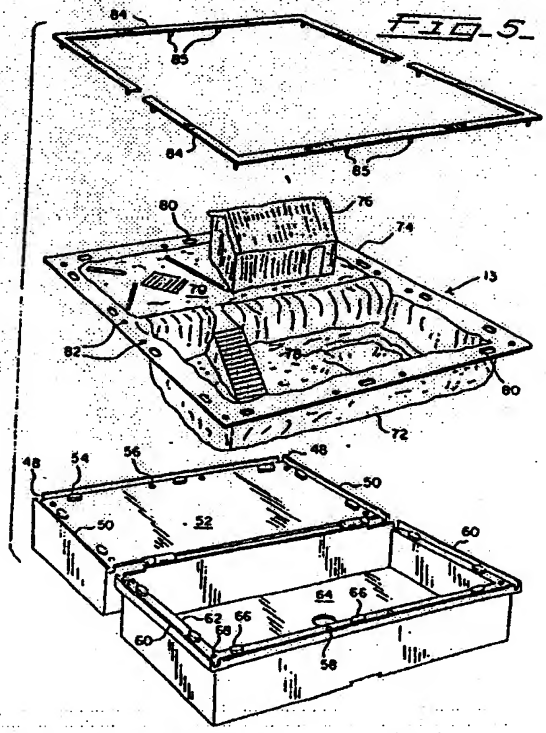


FIG 5



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

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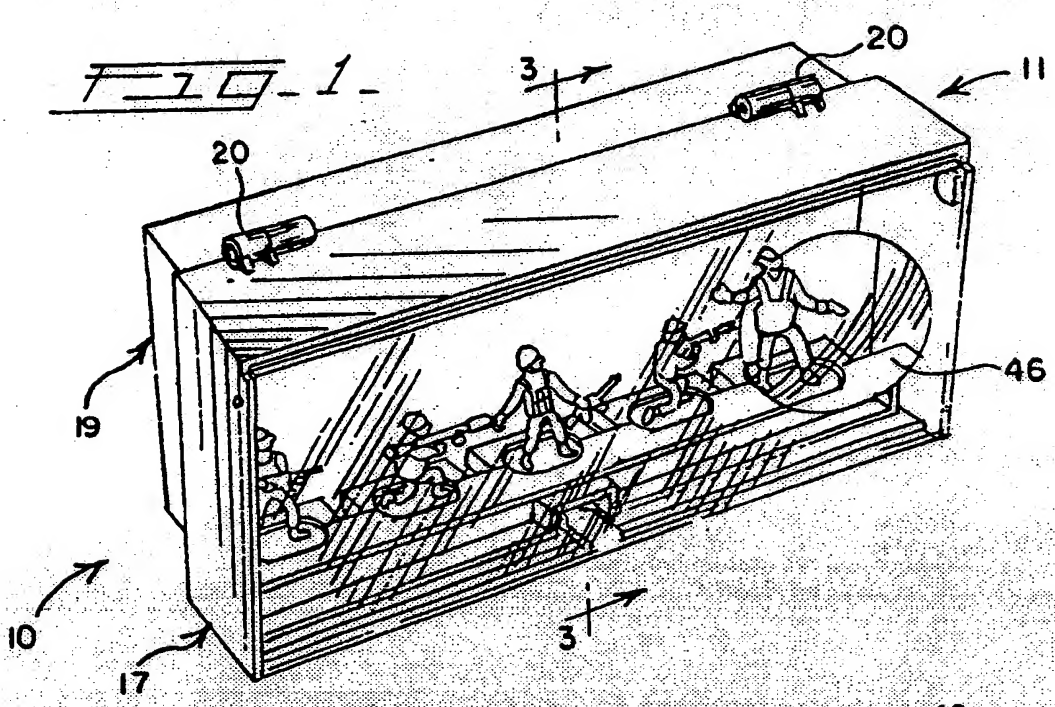
FIG. 1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3
11
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19
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FIG. 2

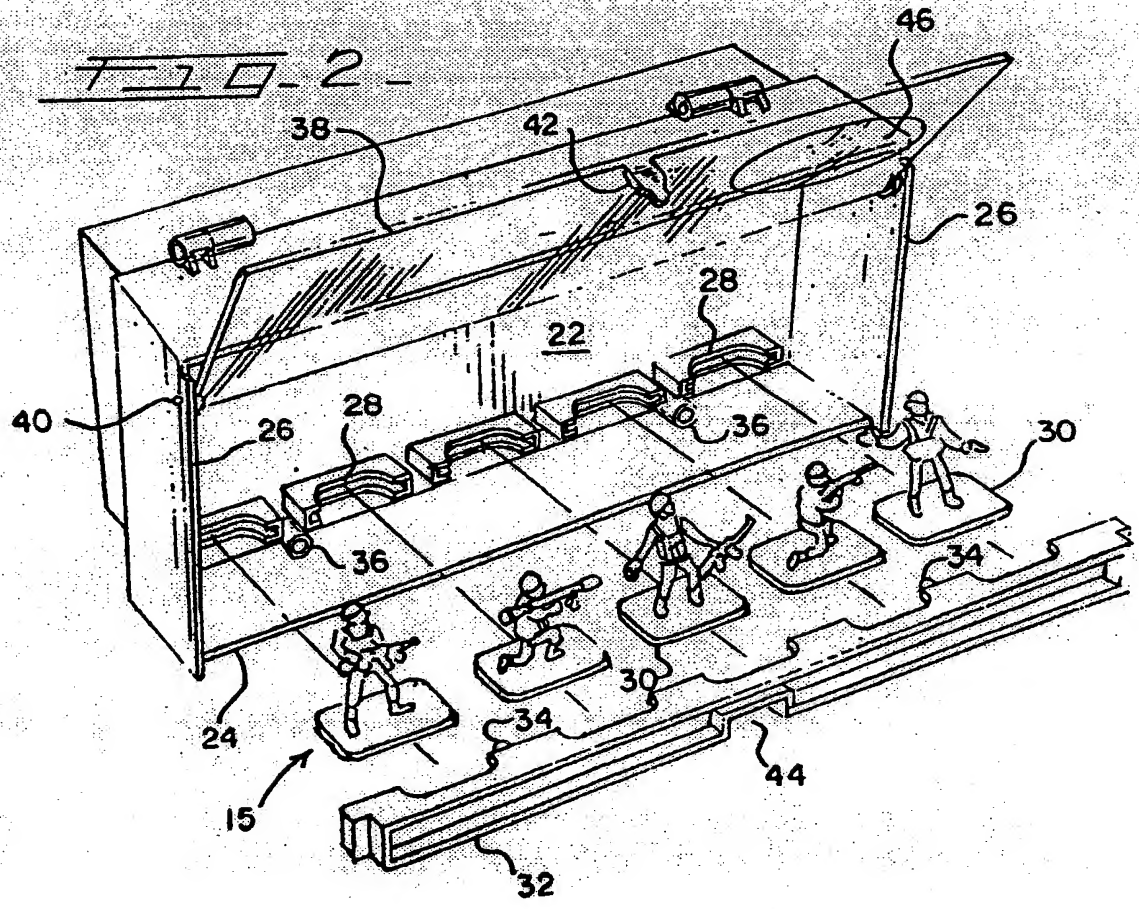
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FIG-4

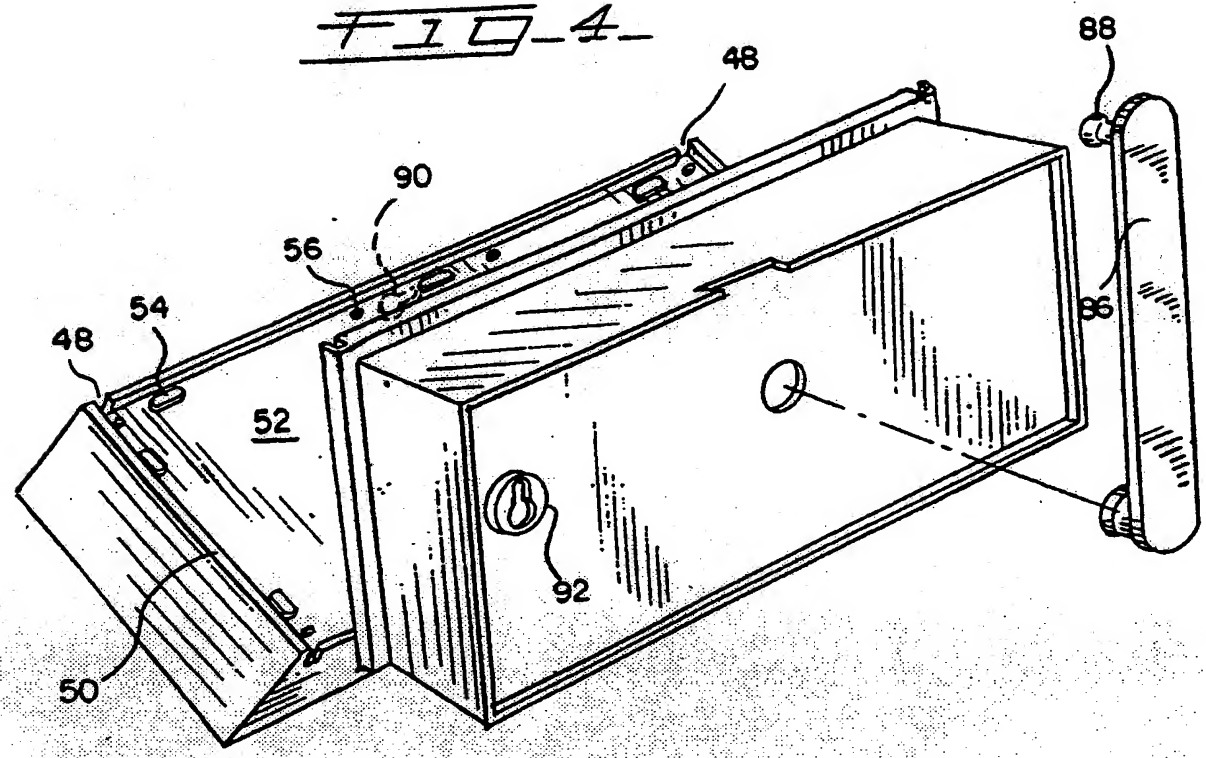

FIG-3

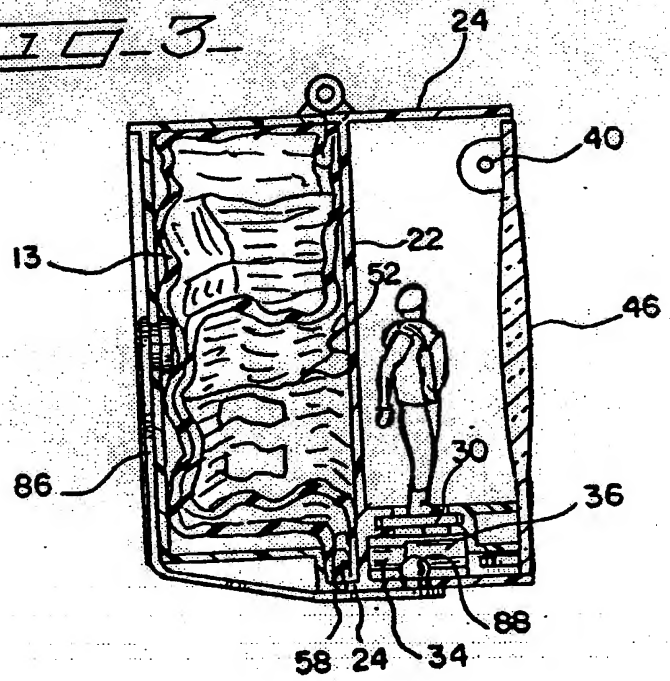

FIG. 5

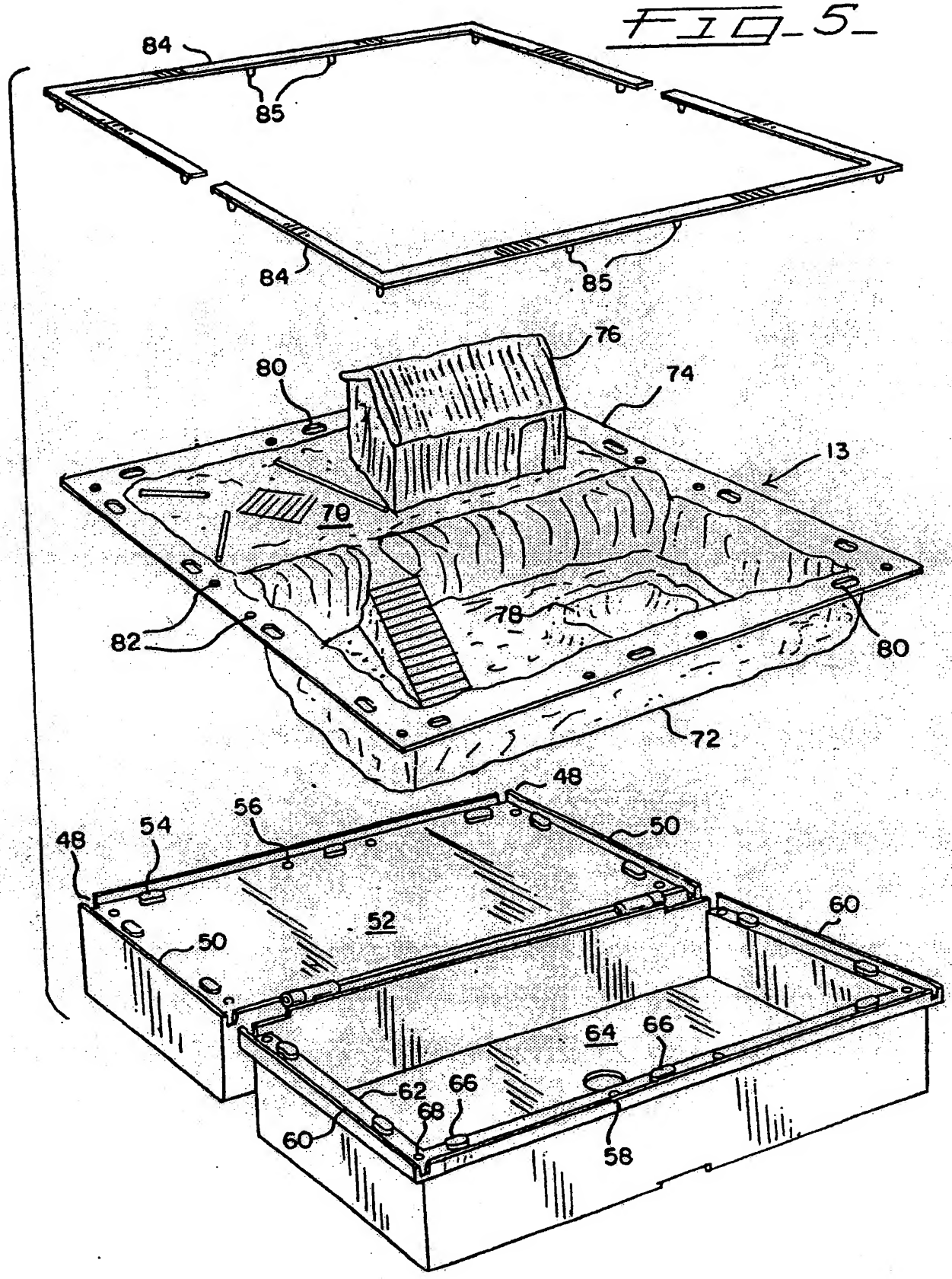
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FIG-7-

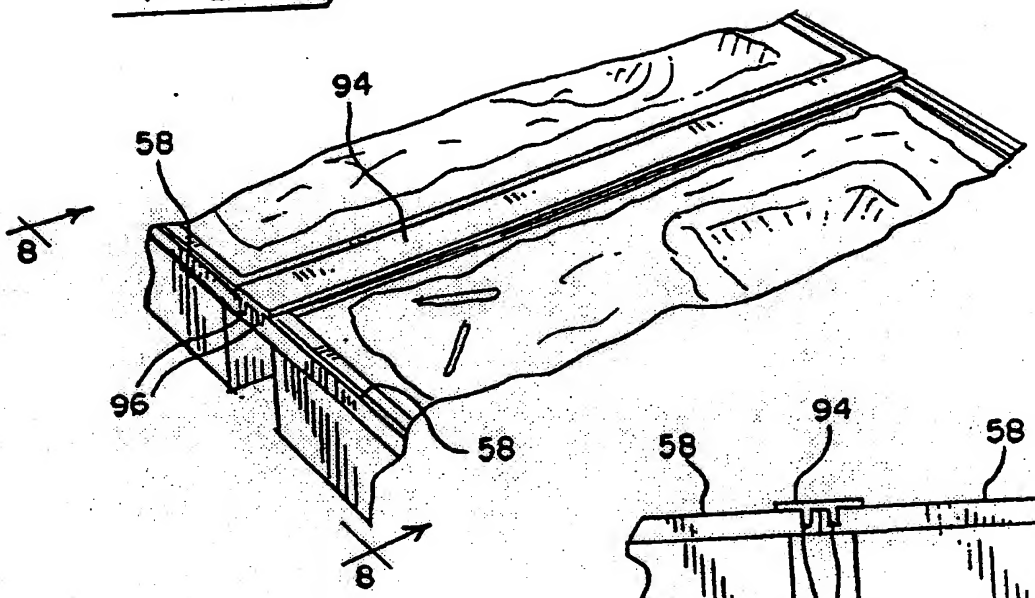
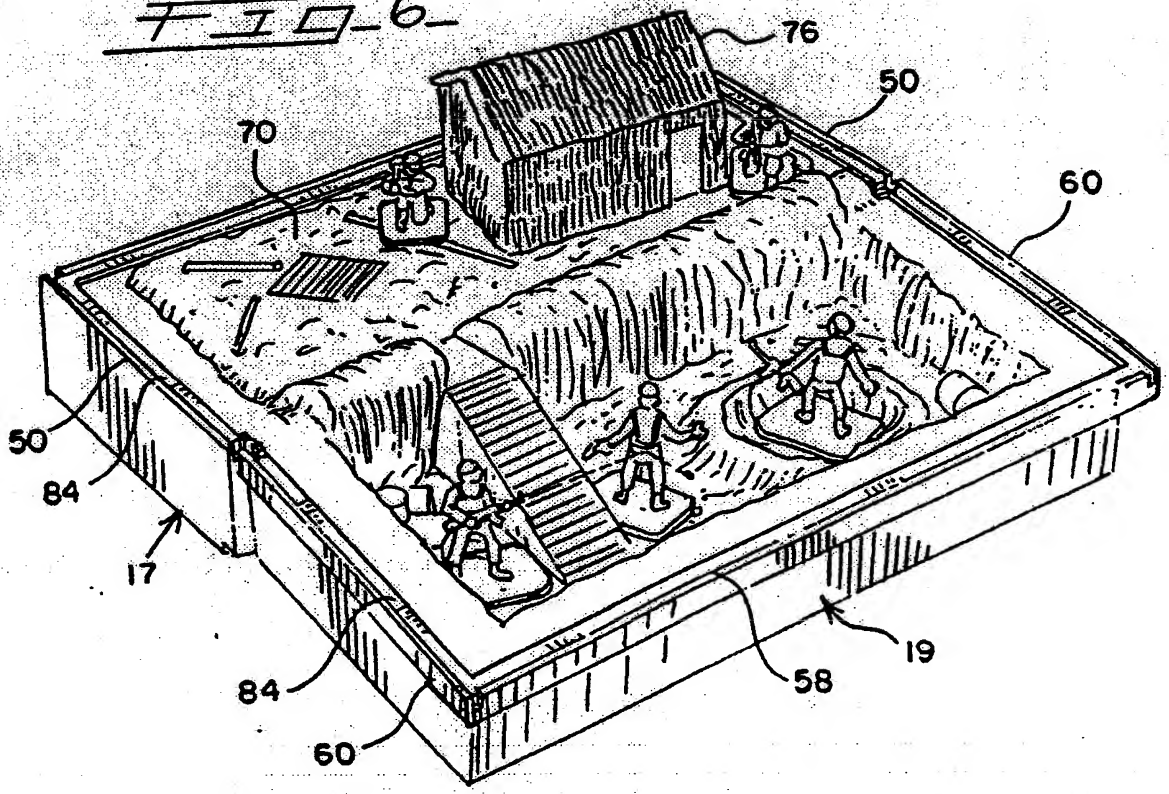


FIG-8-

FIG-6-



DIORAMA TOY KIT

Background Of The Invention

This invention relates to miniature amusement devices and, more particularly, to a self-contained toy kit capable of simulating selected scenes, conditions and events.

Miniature toys which simulate realistic characters and/or objects have ever provided a source of amusement and delight for children and grownups alike. The popularity, for example, of toy soldiers, miniature doll houses, model automobiles, and the like, is well known.

Toy kits comprising a plurality of individual parts or pieces present problems of safe and convenient storage when the toys are not in use. Simple tossing of the individual pieces into a box or similar container is often unacceptable because it may cause damage such as scratching, chipping of paint, tearing or puncturing, or the like, depending on the particular materials of construction.

Other problems encountered with toy kits relate to their portability and the ease with which they may be assembled, disassembled and carried from place to place. Ideally, the kit pieces may be safely stored and transported in the smallest feasible carrying case and the carrying case should itself comprise an element of the assembled toy.

Summary Of The Invention

The present invention provides a toy kit having a realistic setting in the form of a miniature diorama and a plurality of figures or objects positionable as desired on or in the three-dimensional scene. The kit includes a compact carrying case for safely storing and transporting the individual pieces

and also functioning as a base or support for the diorama scene.

Briefly, the invention comprises a compact carrying case having a pair of hingedly connected members which, when in the closed storage mode, provide a pair of compartments. Means is provided in one compartment for holding the individual miniature figures or objects. Cooperating locking means is also provided for insuring against unwanted movement of the figures during storage.

The invention comprises further a miniature scene or diorama. The diorama is formed of a flexible but durable material, such as latex, and natural or synthetic rubbers. When the case is closed, the flexible diorama is folded and stored nicely in the second compartment. When it is desired to set up the scene, the second compartment is opened whereupon the resiliency and memory-retaining characteristics of the material of construction cause the diorama to return automatically to its original three-dimensional state. At the same time, the opened case members provide a solid and level base for supporting the diorama so that the figures may be positioned thereon as desired.

The invention also provides a transparent cover for the first compartment permitting observation of the stored figures. The cover includes a magnification area so that the miniature figures may be examined in detail if desired.

According to another feature of the invention, multiple dioramas are connectable in modular arrangement to provide larger and varied scenes.

Numerous other features and advantages of the present invention will become apparent from the following detailed description of the invention, from the claims and from the accompanying drawings.

Brief Description Of The Drawings

In the accompanying drawings forming a part of the specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a perspective view of a diorama toy kit embodying the principles of the invention and showing the same in the closed storage condition;

Figure 2 is a similar view showing the top compartment of the case open with the figures removed;

Figure 3 is a sectional view substantially on the plane of line 3-3 in Figure 1;

Figure 4 is a bottom perspective view;

Figure 5 is an exploded perspective view showing the bottom compartment of the case fully opened and the diorama and its retaining means separated therefrom;

Figure 6 is a perspective view showing the diorama kit fully set up;

Figure 7 is a fragmentary perspective view showing a pair of dioramas in modular connection; and

Figure 8 is a sectional view on the plane of line 8-8 in Figure 7.

Detailed Description Of The Invention

Referring with greater particularity to the various figures of the drawings, the reference numeral 10 indicates a diorama toy kit embodying the principles of the invention. Toy kit 10 comprises generally a two-compartment case 11, a diorama 13 and a plurality of miniature figures 15.

Case 11 comprises a top compartment 17 and a bottom compartment 19 hingedly connected as at 20. The top compartment 17 comprises a rectangular box having a floor 22, side walls 24, 24, and end walls 26, 26. Projecting integrally from the facing surface of the floor 22 are a plurality of figure holders 28, said

holders being adapted to receive therein the pedestals or bases 30 formed on each of the figures 15 (see Figures 1, 2 and 3). A figure retaining bar 32 cooperates with the holders 28 to hold the figures in stored condition, and said bar is operationally held by the frictional engagement of pin projections 34 receivable in short tubes 36 projecting from the floor 22.

A transparent cover member 38 is pivotally connected to the end walls 26 by pintles such as 40 for closing the compartment 17 while permitting observation and viewing of the figures stored therein. The cover member 38 carries a finger 42 which is frictionally engageable with a side wall 24 to close the compartment 17, said finger 42 being receivable in a notched opening 44 formed in the retaining bar 32. The cover member 38 preferably is formed with a double convex magnifying area 46 whereby the miniature figure positioned thereunder may be observed in larger detail.

As seen best in Figure 5, floor 22 is recessed slightly from the rear edges of the side walls 24 and end walls 26 and said side walls comprise end notches 48 so that the rearwardly extending end wall segments provide rims 50 for reasons which will become apparent as the description proceeds. The rear surface 52 of the floor 22 is formed with a plurality of upraised pads 54 and spaced holes 56 whose function will likewise subsequently be described.

The bottom compartment 19 comprises a slightly smaller rectangular box having a top rim defined by side rims 58, 58, and end rims 60, 60, that aligns and mates with the walls and rims of the top compartment 17. Interiorly, the compartment 19 comprises a ledge 62 and a reduced dimension well 64. The ledge 62 is formed with a plurality of upraised pads 66 and spaced holes 68

of similar configuration and arrangement as those provided on the rear surface 52 of the floor of the top compartment. When the case 11 is fully opened and placed on a horizontal supporting surface, the surface 52 and ledge 62 lie in substantially the same plane and provide, in effect, a level supporting table for the diorama and figures.

The diorama 13 comprises an elastic and flexible member having multiple levels such as upper level 70 and lower level 72 and a perimetral flange 74. Various three-dimensional features such as a hut 76 and a fox hole 78 are formed in relief on the diorama 13, the embodiment illustrated thereby simulating a Vietnam War jungle scene. Alignment holes 80 and retainer holes 82 are cut in the flange 74. The diorama comprises a memory-retaining elastomeric material, such as latex and natural or synthetic rubbers, and may be made by well known conventional methods like dip molding and slush molding.

For operationally mounting the diorama 13 in the case 11, the invention comprises a pair of channel-shaped retainers 84 having depending retainer pins 85. To assemble the diorama, the alignment holes 80 are positioned over the pads 54 and 66 and the pins 85 of the retainers then press-fit through the holes 82 and into the holes 56 and 68. When thus assembled, it will be seen that the lower level 72 of the diorama fits within the well 64 while the upper level 70 rests on surface 52.

When storage is required, the two case compartments are simply pivoted together to fold or compress and enclose the diorama 13 therein (see Figure 3). A atching means, such as a flexible strap 86 is provided for latching the kit in the closed storage condition. The strap 86 is pivotally connected and

carries a pin 88 selectively cooperable with a slot 90 formed in the side wall 24 of the upper compartment and a similar slot 92 formed in the bottom of the lower compartment (see Figure 4).

Dioramas depicting other battle scenes, such as a landing beach or a bunker and trench position, may be substituted for the jungle scene here illustrated. If desired, a diorama may be changed in a single case 11 by removing the retainers and positioned diorama and operationally replacing with another. On the other hand, means is provided for modular connection of a number of toy kits 10, said means comprising a connector bar 94 (see Figures 7 and 8). Connector bar 94 comprises a pair of depending legs 96, 96, forming a longitudinal channel adapted to frictionally fit over the end rims 50 and 60 of a pair of abutting cases 11.

It should be appreciated that a preferred embodiment of the invention has been described herein for illustrative purposes only and is not intended to be otherwise limiting of the structural concepts of the invention. Thus, for example, other types of diorama scenes and figures may be substituted, such as racing tracks, circuses, cars, horses, other animals, and the like. Other changes and variations may be made by those skilled in the art without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. A miniature toy kit comprising:

a case having a pair of pivotally connected compartments;

a plurality of figures;

means in one of said compartments for storing said figures;

a three-dimensional diorama; and

retainer means operationally mounting said diorama in said case with portions thereof positioned in the other of said compartments,

said compartments being pivotable between an open condition wherein the same provide a support field for the diorama and figures and a closed condition wherein the same provide a storage case for the diorama and figures,

said diorama comprising an elastic member compressible into the case when in the closed condition and springing back to three-dimensional form when the case is in the open condition.

2. A miniature toy kit according to claim 1 wherein said case comprises a top compartment and a bottom compartment, said top compartment comprising a rectangular box having side walls, end walls and a floor, said first-mentioned means being positioned on said floor.

3. A miniature toy kit according to claim 2 wherein each of said figures comprises a base, said first-mentioned means comprising a plurality of holders adapted to receive portions of said figure bases, and a complementary retaining bar frictionally connectable to said holders for securely retaining the figures in stored condition.

4. A miniature toy kit according to claim 3 comprising a cover pivotally connected to said top compartment for closing same, said cover being transparent whereby the stored figures are visible therethrough.

5. A miniature toy kit according to claim 4 wherein said cover comprises a magnification area whereby a stored figure positioned thereunder is visibly magnified.

6. A miniature toy kit according to claim 2 comprising latching means on said top and bottom compartments for latching said compartments in the closed condition.

7. A miniature toy kit according to claim 2 wherein said bottom compartment comprises a rectangular rim of complementary configuration with the walls of said top compartment, an inwardly extending ledge and a well for supporting portions of the operationally mounted diorama when the case is in the open condition and for containing the compressed diorama when the case is in the closed condition.

8. A miniature toy kit according to claim 7 wherein said retainer means comprises a pair of channel-shaped retainers having depending retainer pins, said retainer pins adapted to pass through holes in border portions of the diorama and being frictionally engageable in retainer holes formed in said ledge and floor.

9. A miniature toy kit according to claim 8 wherein said ledge and the bottom surface of said floor

comprise a substantially planar surface when the case is in the open condition.

10. A miniature toy kit according to claim 9 comprising connector means for connecting a pair of said open condition cases in modular relationship.

11. A miniature toy kit according to claim 10 wherein said connector means comprises a bar having a pair of depending legs forming a longitudinal channel, said channel being frictionally engageable over the rims and portions of the top compartment end walls of a pair of abutting open condition cases.

12. A miniature toy kit substantially as herein described with reference to the accompanying drawings.

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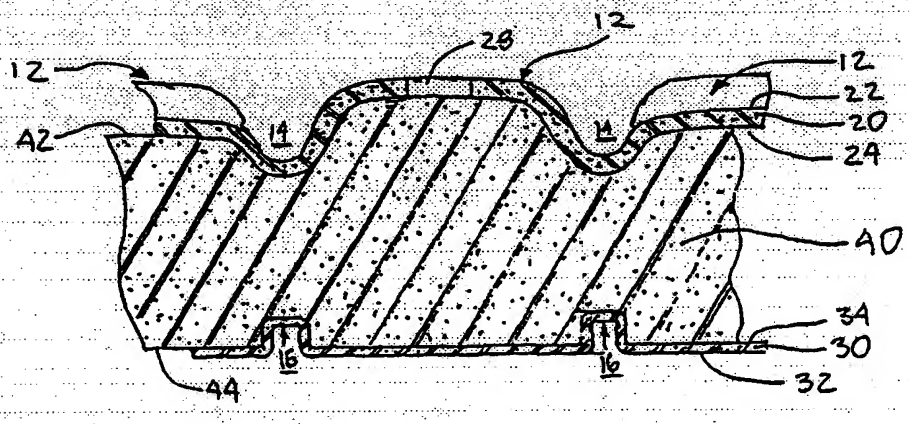
(54) Title: COMPOSITE FOAM MATTRESS HAVING MULTIPLE LAMINATE CONSTRUCTION



(57) Abstract

A compressible pad having a resilient core (40) wholly surrounded by and bonded to an upper layer (20) and a lower layer (30) of less resilient material wherein the upper and lower layers are bonded at their common perimeter to form an enclosed member. In one embodiment, a plurality of slits (28) are formed in one layer to permit passive ingress and egress of air into and from the void occupied by the core. In another embodiment, a valve is disposed between the environment and the core to permit air ingress and egress. Features of the invention include the formation of contours (12) on the upper and/or lower surface of the pad to alter the deflection properties of the pad, and/or facilitate storage of the pad or inflation of the pad. Preferably, the upper and lower layers are constructed from a closed cell foam and the core is constructed of an open cell foam.

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COMPOSITE FOAM MATTRESS HAVING MULTIPLE LAMINATE CONSTRUCTION

Field of the Invention:

The present invention pertains to the field of self-inflating ground pads, and more particularly to those having a multiple laminate foam construction.

Background of the Invention:

In the field of ground pads, there have traditionally been two distinct avenues for achieving the desired combination of suitable support, insulative characteristics, and desirable storage dimensions. The first avenue arrived shortly after the introduction of foamed polymers into the market place. These pads consisted mainly of a slab of closed cell foam material that could be conveniently rolled into a storable form. Subsequently, these pads were enhanced by incorporating features or protrusions on the upper surface of the slab. Nevertheless, these pads have remained essentially unchanged since their introduction.

The second avenue arrived during the early 1970's. This second approach to ground pads utilized a highly compressible foam slab to which was bonded to an airtight skin. A valve was placed so that the interior chamber defined by the skin would be in fluid communication with the environment. Thus, when it was desired to inflate the pad, the user need only open the valve to permit the uncompressing foam to draw air into the chamber. When the pad was fully inflated, the user closed the valve to maintain the air volume in the pad. Because the volume was constant, and the pad shape retained by the bonding of the skin to the foam, localized compression of one portion of the pad would increase overall internal air pressure without the traditional air mattress bulging in uncompressed sections. For a more detailed review of this technology, reference is made to United States Patent numbers 3,872,525; 4,624,877; and 4,205,974 and for purposes of this patent, are incorporated by reference herein.

Each field of pad technology has its strengths: closed cell foam pads are highly durable in that they are not easily torn and if punctured, have no noticeable

decrease in performance, stow easily, and are light in weight; self-inflating pads as described above are very comfortable, easily compressible and stow easily. However, closed cell foam pads are not inherently comfortable and self-inflating pads are not highly durable and are often noticeably more expensive to manufacture than closed cell foam pads.

Another line of pads is also used, although their use in the field of outdoor recreation has been more limited. These pads utilize one or more foam slabs surrounded by, but not bonded to, a fabric shell. In this respect, these pads resemble certain traditional household mattresses. While these pads are rather inexpensive to manufacture and are considered to be comfortable, they provide little resistance to water absorption, do not stay compressed for storage without an auxiliary compression strap system, and are not durable when compared to other technologies such as closed cell foam products. Water absorption in particular can make the pads cold and noninsulating while making them heavier to carry. Both are highly undesirable features in a ground pad used for hiking and mountaineering.

Therefore, the primary objectives for a ground pad have been achieved with mixed success. Traditional performance pads might have good insulating properties, be highly durable and low in weight, and have low manufacturing cost, however these goals are usually achieved at the expense of user comfort. Conversely, comfortable performance pads may also have good insulating properties and compactability, however, these goals are usually achieved at the expense of manufacturing cost, puncture susceptibility, and increased weight. It is therefore desirable to develop a ground pad that has the advantages of a closed cell foam pad with the primary advantage of comfort associated with a self-inflating pad. The present invention is intended to meet these objectives.

SUMMARY OF THE INVENTION

The present invention combines the desirable qualities of traditional closed cell foam pads with the advantages inherent in a self-inflating pad. By [SME1]bonding a shell of resilient material to a slab of resilient material having a density less than the shell, and by permitting the ingress and egress of air into and out of the chamber

defined by the shell, the stated objective can be achieved. Broadly stated, a pad according to the invention comprises a first outer layer constructed from a first type of resilient material which defines an outer surface, an inner surface, and a perimeter portion; a second outer layer constructed from a second type of resilient material which defines an outer surface, an inner surface, and a perimeter portion; and an inner layer constructed from a third type of resilient material which defines a first major surface, a second major surface, and a perimeter portion wherein the inner layer is disposed between and permanently bonded at least in part to the inner surface of the first outer layer and the inner surface of the second outer layer. Preferably, the perimeter portions of the first and second outer layers are bonded to one another to form a substantially fluid tight seal, thereby shielding the inner layer from exposure to the elements. To permit fluid ingress and egress into the chamber defined by the first and second outer layers, the invention may be fitted with a valve closable at user discretion, or one or more apertures may be formed in either outer layer to permit passive ingress and egress of fluid into and out of the chamber.

In a preferred embodiment, the inner layer is constructed of a foamed thermoset polymeric material having a stiffness of between about 10 and 45 lb 25% IFD and a density of between about 0.7 and 2.5 lbs/ft^3, and preferably having a stiffness of between about 30 and 40 lb 25% IFD and a density of between about 1.0 and 1.7 lbs/ft^3. Sectional thickness of the inner layer can range between about 0.25" to 4", and preferably between about 1.0" and 1.75". Best results have been achieved using an open cell, flexible, slabstock polyurethane foam.

Those persons skilled in the art will appreciate that the nature of the core is not essential to the invention insofar as any compliant or resilient material of homogenous or heterogeneous composition that provides a desirable level of stiffness, resilience, compressibility, and insulative characteristics will suffice. Thus, by way of example only, the core can be comprised of discrete portions having differing 25% IFD values such as is described in United States Patent number 5,282,286, which is incorporated herein by reference; it can be contoured prior to any thermoforming or subsequent fabrication steps as detailed below; it can be modified as described in United States Patent number 5,705,252, which is also incorporated herein by reference.

Also in a preferred embodiment, the first outer layer (for convention purposes the upper layer which contacts a user) is constructed of a closed cell foamed thermoplastic polymeric material having a density of between about 0.5 and 20 lbs/ft^3, and preferably having a density of about 2 lbs/ft^3. Sectional thickness of the first outer layer can range between about 0.005" to 0.75", and preferably about 0.25". The second outer layer (for convention purposes the lower layer which contacts the ground) is constructed of a closed cell foamed thermoplastic polymeric material having a density of between about 0.5 and 20 lbs/ft^3, and preferably having a density of about 3 lbs/ft^3. Sectional thickness of the first outer layer can range between about 0.005" to 0.5", and preferably about 0.125". Best results for both the first and the second outer layers have been achieved using a closed cell, flexible, polyolefin foam. The foam consists of polyethylene and ethylene vinyl acetate (EVA) wherein the EVA content is between about nominal to 20% by weight.

As with selection of the material for use as the inner or core layer, selection of material for the outer layers is not limited to varieties of closed cell foam used with a preferred embodiment. Those persons skilled in the art will realize the broad scope of materials having the requisite level of stiffness, resilience, compressibility, and insulative characteristics. While use of closed cell foam material for the second or bottom layer is preferred, it is within the scope of the invention to use sheet material such as solid polyethylene to form either or both of the top and bottom layers.

Bonding between the inner layer and the two outer layers can be achieved by any traditional means for bonding the resilient materials selected to construct the invention. Thus, direct thermal bonding, flame laminating, or chemical adhering are within the scope of possibilities for bonding the layers. When using the layers described above with respect to a preferred embodiment, it has been ascertained that latex based adhesive PO9050 manufactured by Bostik, Inc., or Fastbond 100 neoprene-based adhesive by 3M provide a suitable bond between the several layers when used according to the manufacturers recommendations.

The bonding process referenced above is preferably enhanced by using thermoforming. In such a process, the laminate set up is subjected to heat and compression to ensure that the bond at the layer interfaces is complete and coextensive. It is during this process, that any features or surface details can be formed on the first and/or second outer layers. In addition, if a perimeter bond is desirable, the same can be accomplished at this stage. Thus, while basic adhesion between the several layers is carried out prior to thermoforming the pad, the thermoforming process not only enhances the bond, but can also be used to establish any perimeter bond and outer surface details.

These and other features of the invention will be better ascertained by reference to the accompanying drawings and to the detailed description of the invention which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of the invention shown in a rolled or stowed state;

Fig. 2 is an end elevation view of the invention shown in Fig. 1;

Fig. 3 is a perspective view of the invention shown in an unrolled or ready to use state;

Fig. 4 is a perspective detail of a portion of the invention shown in Fig. 3;

Fig. 5 is a cross section elevation taken substantially along the line 5 – 5 in Fig. 4 detailing the contours of the various foam materials used to construct the invention;

Fig. 5a is a perspective view in partial cross section of an alternative embodiment wherein the upper surface contours or features are transverse ribs;

Fig. 6 is a partial perspective view of the lower side of the invention;

Fig. 7 is a partial perspective view of the upper side of the invention wherein the several foam laminates are partially peeled away;

Fig. 8 is a plot of pad deflection versus a10 $inch^2$ surface load comparing a non-contoured pad and a pad having features molded in the upper surface thereof; and

Fig. 9 is a plot of maximum fill height versus contour diameter (dimensionless) illustrating certain permissible ratios between these two values when creating

contours that must be filled by a foam core during manufacture and having a schematic inset showing the testing apparatus.

DETAILED DESCRIPTION OF THE INVENTION

Turning then to the several figures wherein like numerals indicate like parts, and more particularly to Figs. 1- 5, the general nature of pad 10 is shown. Pad 10 comprises upper shell portion 20, lower shell portion 30, and core 40, alternatively referred to as first layer 20, second layer 30, and third layer 40. Upper shell portion 20 has outer surface 22, inner surface 24, and perimeter portion 26; similarly lower shell portion 30 has outer surface 32, inner surface 34, and perimeter portion 36. Core 40 has first major surface 42 and second major surface 44 in addition to peripheral surface 46. Both shell inner surfaces 24 and 34 are wholly bonded to, respectively, major surfaces 42 and 44 of core 40. Upper shell portion 20 is bonded at its perimeter portion 26 to perimeter portion 36 of lower shell, thereby encasing core 40 and defining an enclosed volume . It should be noted, however, that a perimeter portion of core 40 may be disposed between inner surfaces 24 and 34 only to the extent that such interposition does not negatively affect the bonding of the two portions. The straps 50a and 50b and their attachment mechanism 60 are removable and optional.

Upper shell portion 20 is preferably formed from a 24" wide and 72" long slab of closed cell polyethylene and ethylene vinyl acetate foam material having a maximum EVA content from about nominal to 10%. Those persons skilled in the art will appreciate the effect that the addition of EVA will provide, namely enhanced flexibility. Thus, while durability of upper shell portion 20 is desirable, the overall comfort of this layer should not be sacrificed in favor of durability as compared to lower shell portion 30 described in detail below. Final sectional thickness is preferably about 0.25" based upon the overall dimensions of pad 10 described herein, although the acceptable range is from about 0.005" to 0.5". Upper shell portion 20 preferably has a density of about 2 lbs/ft^3, although the range can be from 0.5 to about 20 lbs/ft^3.

A beneficial feature of upper shell portion 20 is that the chosen material is inherently hydrophobic. Consequently, water and water based solvents are not drawn towards shell portion 20. Thus, core 40 tends to remain dry as will be described in more detail below.

Lower shell portion 30 is also preferably formed from a 24" wide and 72" long slab of closed cell polyethylene and ethylene vinyl acetate foam having a maximum EVA content of about from nominal to 2% depending upon the degree of toughness desired. Sectional thickness is preferably about 0.125" based upon the overall dimensions of pad 10 described herein, although the acceptable range is from about 0.005" to 0.5". Upper shell portion 20 preferably has a density of about 3 lbs/ft^3, although the range can be from 0.5 to about 20 lbs/ft^3. As with upper shell portion 20, the selected material is inherently hydrophobic. The densities for both lower and upper sections are defined by The American Society for Testing Materials (ASTM) in method D-3575.

Finally, core 40 is preferably formed from a 24" wide and 72" long slab of open cell polyurethane foam having a sectional thickness of about 1.25" based upon the overall dimensions of pad 10 described herein, although the acceptable range is from about 0.25" to 4". Core 40 preferably has a density of about 1.45 lbs/ft^3 and a stiffness 25%IFD value of 36 lbs., although the density range can be from 0.5 to about 20 lbs/ft^3 and the 25% IFD stiffness value range can be from 10 to 45 lbs. The values of density and IFD are defined by the American Society for Testing and Materials (ASTM) in Method 3574. While not necessary to the operation of the invention, the width and length dimensions of core 40 are slightly less than the overall pad dimensions since it is wholly surrounded by upper shell portion 20 and lower shell portion 30. In this manner, when perimeter portions 26 and 36 are joined as described below, no portion of core 40 is exposed directly to the environment. Consequently, the hydrophilic nature of core 40 will not degrade from the performance of pad 10 by contact leaching of moisture from the environment.

Those persons skilled in the art will appreciate the stiffness to density ratio present in the instant invention: core 40 has a relatively high stiffness for the given

density. In conventional self-inflating pads, a high stiffness value would otherwise provide less comfort to a user. However, because upper shell portion 20 is constructed from a foam having a relatively high density, localized compression loading of this surface is distributed across a greater area of core 40 than would be possible using a flexible fabric shell. Thus, a greater self-inflation biased foam can be used, which also provides for enhanced support features without sacrificing user comfort. By the same token, a very low density core can be used without sacrificing performance of pad 10. Because the instant invention is vented to atmosphere, a higher IFD foam is used to provide adequate support to prevent the user from "bottoming out" onto the ground.

While it is considered desirable to use an upper shell portion having a higher density than the core, it may be desirable to modify the compliance of the upper shell without modifying the composition of the material comprising the upper shell. Through research, it has been found that the deflection or compliance characteristics of a given upper shell portion material can be varied by forming certain details therein. As best shown in Fig. 8, greater deflection or compliance of pad 10 can be achieved when certain modifications in the form of features are formed in upper shell portion 20 as compared to a similar pad not having features formed therein. It is also beneficial to note the relatively smooth deflection curve produced by pad 10 when incorporating upper shell features. As those persons skilled in the art will appreciate, conventional self-inflating pads have a desirable compliance curve until the portion of the core subject to loading is fully compressed, where after the compliance values sharply level off. By utilizing a moderately compliant upper shell portion, a highly compliant core, and low compliance lower shell portion, it is possible to provide desirable progressive compliance characteristics to pad 10.

Turning to Figs. 3 and 4, it can be seen that the contours or details noted above preferably take the form of a series of convex dome protrusions 12 that are formed in upper shell portion 20. To ascertain the nature of desirable contours to incorporate in pad 10 so as to vary the initial compliance, two primary factors were considered. The first factor related to the effect that contour incorporation would have on the nature of the bond interface between major surface 42 of core 40 and

inner surface 24 of upper shell portion 20; the bond should be coextensive and robust. The second factor related to user perception of comfort. Incidental considerations included whether the contours would enhance or degrade use or storage of a pad, deleteriously affect the insulation properties of a pad, and withstand being rolled and compressed for long periods without being permanently deformed.

Regarding the first factor and as a preliminary matter, contours or details having sharp edges or deep profiles would likely decrease the ability of inner surface 24 of upper shell portion 20 to bond with major surface 42 of core 40. Thus, the nature of any given detail should not include radical areas of surface transition or nook and crannies that would be difficult for the core material to occupy.

To determine viable detail parameters during the development of the invention, the inventors formed holes of various diameters in a compression die and subjected core 40, consisting of a 36 lb. 25% IFD, 1.45 lb./ft^3 density slab of polyurethane foam, to various compression loads. The results of these tests, shown in Fig. 9, assisted the inventors in determining the permissible physical parameters for any potential detail: because the core material would only extend to a limited degree during manufacturing compression based upon a given hole dimension, the selected detail would have to have a volume equal to or less than the observed core volume extending beyond the compression die, and have complimentary physical parameters. Thus, selection of a detail that would retain sufficient contact with the core material would ensure that there would be sufficient bonding between the core and the upper shell portion.

Concerning the second factor, earlier research derived during development of a conventional closed cell pad such as is described in United States Patent number 4,980,936 incorporated by reference herein indicated that a protrusion 12 having a diameter of about 2" (based upon the overall dimensions of the pad described herein) provided the desired level of deflection modification (increasing compliance) while remaining essentially undetectable by the user. Naturally, the nature of material used and pad deflection properties will be variables worthy of consideration.

Therefore, the foregoing is intended to provide an example of second factor considerations and not a limitation thereof, as will be shown with respect to a second embodiment in Fig. 5a.

As a consequence of these two initial findings, in combination with the ancillary considerations noted above, it was found that domed convex protrusions having a diameter of about 2" were optimal. The location and arrangement of protrusions 12 on outer surface 22 were selected based in part upon the knowledge that pad 10 would be subject to rolling for storage purposes. Thus, protrusions 12 are aligned in rows wherein outer surface 22 of upper shell portion 20 has transverse unadultered portions 14 (see Fig. 4) so that pad 10 will accept transverse creases when rolled for storage. Moreover, every other row of protrusions 12 are longitudinally aligned, with every row being laterally offset from the adjacent rows by a factor of about ½ protrusion. This offset prevents longitudinally adjacent protrusions 12 from directly interfering with each other when pad 10 is rolled for storage purposes. These two factors are demonstrated with reference to Figs. 1 and 2.

An alternative embodiment to that shown in Figs. 1-5 is shown in Fig. 5a. Here, a series of transverse lands 14a are formed in outer surface 22 of upper shell portion 20. Protrusions 12a take the form of ribs as opposed to the domed convex protrusions 12 shown in Figs. 4 and 5. Similar parameters are used to evaluate the physical dimensions of protrusions 12a as were considered with respect to protrusions 12.

Heretofore, attention has been given primarily to upper shell portion 20. However, lower shell portion 30 also has contours formed therein. Turning to Fig. 6, it can be seen that a plurality of transverse lands 16 are formed in lower shell portion 30. These lands correspond sectionally with transverse unadulterd portions 14 in upper shell portion 20 as best shown in Fig. 5, thereby creating transverse portions of pad 10 that naturally accept a folding bias. Consequently, by segmenting pad 10 in such a manner, it more readily rolls for storage as demonstrated in Fig. 2, and more readily accepts a planar shape after initial inflation. In addition, these lands

impart transverse beam strength to the pad, which mitigates against pad distortion during rolling. Beam rigidity during rolling aids in the compression of inner core 40 resulting in a smaller stowed volume.

In the preferred embodiment, a higher density closed cell foam is chosen for the lower shell 30. A higher density foam generally will have superior tensile, tear and abrasion resistance as will be needed on a shell contacting the ground.

Also formed in lower shell portion 30 are a pair of longitudinal lands 18a and 18b (only 18a being shown in Fig. 6). These features are intended to provide a convenient means for locating compression straps 50a and 50b (see Figs. 1 and 3). By providing for strap location in the manner shown, the higher density material present at lands 18a and 18b will increase durability of pad 10 in these areas that will be subject to repeated abrasion from strap use and high compression loads. While lands 18a and 18b need not extend the entire length of pad 10, for convenience they do so.

As noted previously, the present invention may provide for active or passive inflation and deflation. Active inflation and deflation is defined as involving user intervention, usually by way of operation of a valve that is in fluid communication with the interior chamber defined by upper shell portion 20 and lower shell portion 30. Passive inflation and deflation is defined as not involving user intervention, except for compressing and expanding the volume of pad 10 such as when stowing or using the same. Because the material selected in a preferred embodiment for upper and lower shell portions 20 and 30 is to a reasonable extent, inherently fluid impervious, the chamber defined thereby is capable of maintaining a constant volume of fluid or air. Because core 40 is wholly bonded at its major surfaces 42 and 44 to the outer shells, core 40 is caused to act as a tension member. Thus, by incorporating a valve in the manner disclosed and taught by the patents for self-inflating pads referenced herein, the benefits of such a construction can be realized.

However, in view of the short-comings associated with such structures as recited above, pad 10 can also be, and is preferably, used in the passive mode.

Referring specifically to Figs. 4 and 5, it can be seen that a plurality of slits 28 are formed in outer surface 22 of upper shell portion 20. It is desirable to place slits 20 at the top of protrusions 12 so that water is less likely to accumulate over them. These slits have a normal closure bias as a function of material selection so that only when an above nominal pressure differential exists between the environment and the chamber will pad 10 passively inflate or deflate. Furthermore, because upper shell portion 20 is constructed from inherently hydrophobic material, contact moisture migration is all but eliminated, thus preserving the integrity of core 40, which is noticeably hydrophilic.

It is highly desirable to eliminate moisture from the core 40 because it gives the undesirable effects of: increasing the weight which must be carried, greatly reduces the insulating properties of the core, and leads to degradation of the physical properties of the core 40 and adhesives used to bond the shells to the core.

What is claimed:

1. An [SME2]inflatable body comprising:

a first outer layer constructed from a first type of resilient material which defines an outer surface, an inner surface, and a perimeter portion;

a second outer layer constructed from a second type of resilient material which defines an outer surface, an inner surface, and a perimeter portion; and

an inner layer constructed from a third type of resilient material which defines a first major surface, a second major surface, and a perimeter portion wherein the inner layer is disposed between and securely bonded at least in part to the inner surface of the first outer layer and the inner surface of the second outer layer.

2. The inflatable body of claim 1 wherein the first type of resilient material is substantially the same as the second type of resilient material.

3. The inflatable body of claim 1 wherein the first type of resilient material is selected from the group consisting of polyolefins, neoprenes, polyvinyl chloride, EVA, nitrile rubbers, laytex, and polyurethanes.

4. The inflatable body of claim 1 wherein the second type of resilient material is selected from the group consisting of polyolefins, neoprenes, polyvinyl chloride, EVA, nitrile rubbers, laytex, and polyurethanes.

5. The inflatable body of claim 1 wherein the third type of resilient material is selected from the group consisting of polymeric foams, polyurethane foams, fiber battings and polyolefin foams.

6. The inflatable body of claim 1 wherein the first major surface of the inner layer is wholly bonded to the inner surface of the first outer layer and the second major surface of the inner layer is wholly bonded to the inner surface of the second outer layer.

7. The inflatable body of claim 1 wherein the first outer layer has a density less than the second outer layer.

8. The inflatable body of claim 1 wherein the first and second outer layers are substantially directly bonded to each other at common peripheral portions.

9. The inflatable body of claim 1 wherein the outer surface of the first outer layer has contours formed therein.

10. The inflatable body of claim 1 wherein the outer surface of the second outer layer has contours formed therein.

11. The inflatable body of claim 1 wherein the first outer layer is formed from a slab of closed cell foam, the second outer layer is formed from a slab of closed cell foam, and the inner layer is formed from a slab of open cell foam, and wherein the first and second outer layers are substantially bonded to each other at their common peripheral portions thereby defining a chamber.

12. The inflatable body of claim 11 wherein at least one outer layer defines at least one orifice to permit the ingress and egress of fluid into and out of the chamber.

13. The inflatable body of claim 12 wherein a plurality of convex dome contours are formed in the outer surface of the first outer layer.

14. The inflatable body of claim 13 wherein a plurality of transverse land contours are formed in the outer surface of the second outer layer.

15. The inflatable body of claim 12 wherein a plurality of transverse lands are formed in the outer surface of the second outer layer.

16. The inflatable body of claim 11 wherein the surface area of the inner layer's first major surface is less than the surface area of the first outer layer's inner surface.

17. An [SME3]inflatable body comprising:

a first fluid impervious outer layer constructed from a first type of resilient material which defines an outer surface, an inner surface, and a perimeter portion;

a second fluid impervious outer layer constructed from a second type of resilient material which defines an outer surface, an inner surface, and a perimeter portion;

an inner layer constructed from a third type of resilient material which defines a first major surface, a second major surface, and a perimeter portion wherein the inner layer is disposed between and securely bonded at least in part to the inner surface of the first outer layer and the inner surface of the second outer layer and wherein the first and second outer layers are bonded to each other at their common peripheral portions thereby defining a fluid impervious chamber; and

a valve for permitting ingress and egress of fluid into the chamber.

18. The inflatable body of claim 17 wherein the first type of resilient material is substantially the same as the second type of resilient material.

19. The inflatable body of claim 17 wherein the first type of resilient material is selected from the group consisting of polyolefins, neoprenes, polyvinyl chloride, EVA, nitrile rubbers, laytex, and polyurethane.

20. The inflatable body of claim 17 wherein the second type of resilient material is selected from the group consisting of polyolefins, neoprenes, polyvinyl chloride, EVA, nitrile rubbers, laytex, and polyurethane.

21. The inflatable body of claim 17 wherein the third type of resilient material is selected from the group consisting of polymeric foams, polyurethane foams, fiber battings and polyolefin foams.

22. The inflatable body of claim 17 wherein the first major surface of the inner layer is wholly bonded to the inner surface of the first outer layer and the second major surface of the inner layer is wholly bonded to the inner surface of the second outer layer.

23. The inflatable body of claim 17 wherein the first outer layer has a density less than the second outer layer.

24. The inflatable body of claim 17 wherein the outer surface of the first outer layer has contours formed therein.

25. The inflatable body of claim 17 wherein the outer surface of the second outer layer has contours formed therein.

26. The inflatable body of claim 17 wherein the first outer layer is formed from a slab of closed cell foam, the second outer layer is formed from a slab of closed cell foam, and the inner layer is formed from a slab of open cell foam.

27. The inflatable body of claim 26 wherein the first outer layer has a plurality of convex dome contours formed thereon and the second outer layer has a plurality of transverse lands formed thereon.

28. An [SME4]inflatable body comprising:

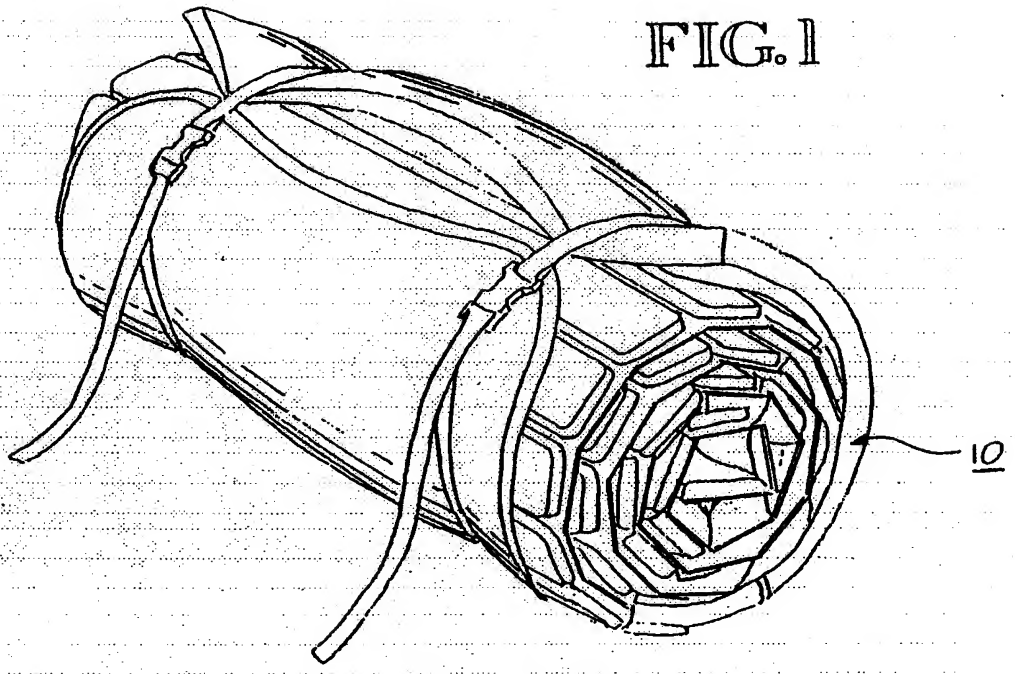
a first outer layer constructed from a closed cell foam material having a first density, and which defines an outer surface, an inner surface, and a perimeter portion;

a second outer layer constructed from a closed cell foam material having a second density that is greater than the first density, and which defines an outer surface, an inner surface, and a perimeter portion; and

an inner layer constructed from an open cell foam material which defines a first major surface, a second major surface, and a perimeter portion wherein the inner layer is wholly enveloped by and securely bonded at least in part to the inner surface of the first outer layer and the inner surface of the second outer layer and wherein the first outer layer defines a plurality of passages to permit gas ingress and egress to and from the inner layer.

29. The inflatable body of claim 28 wherein the first outer layer has a plurality of surface contours.

FIG. 1



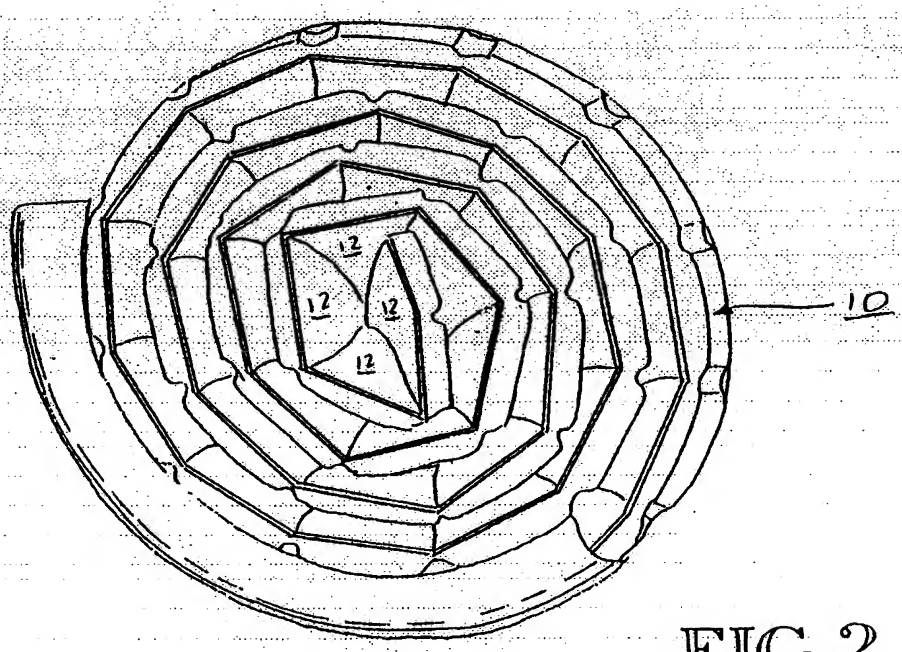


FIG. 2

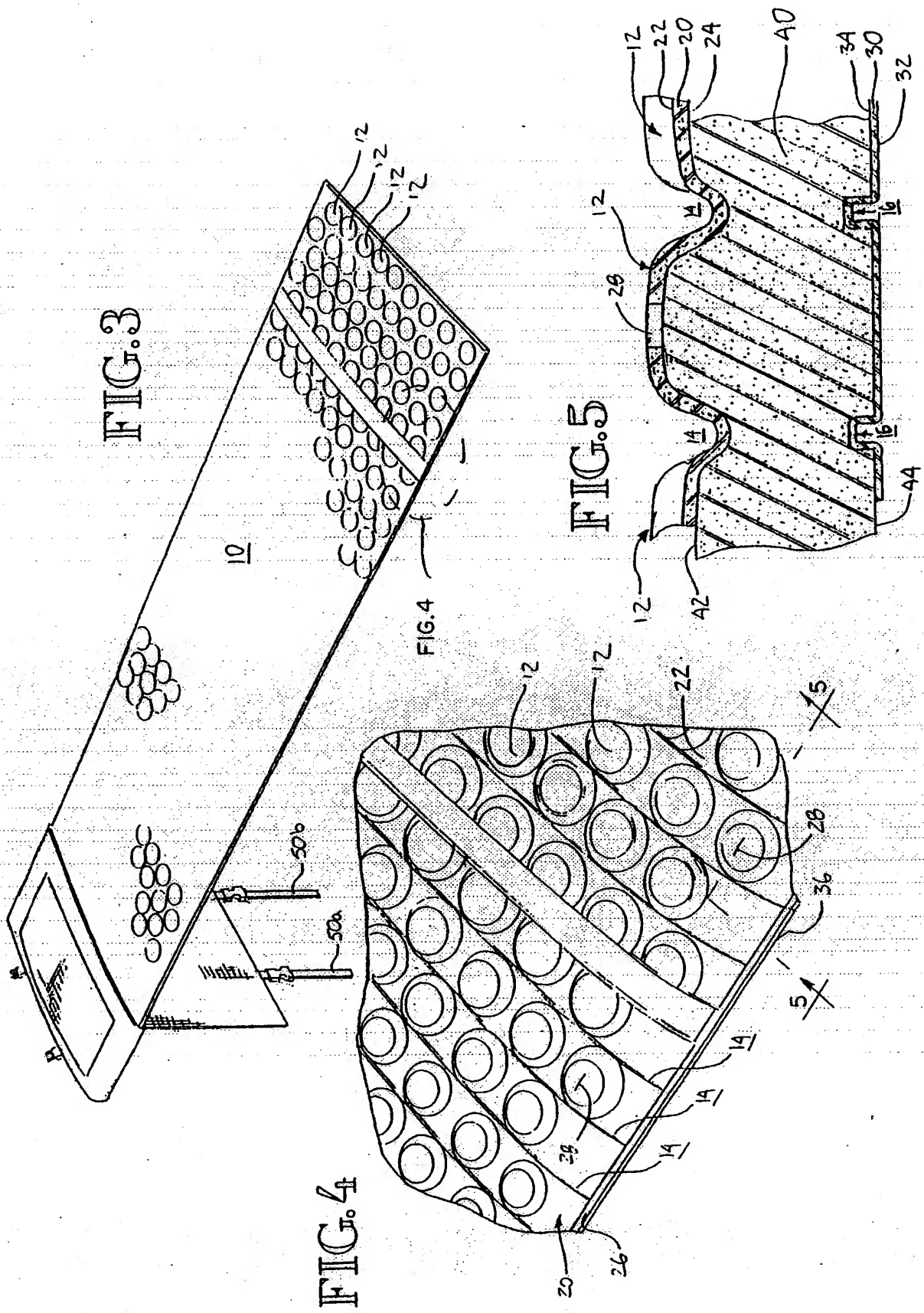


FIG.3
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50b
50a
FIG.4
FIG.5
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FIG.4
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36
14
38
26
20
5
5

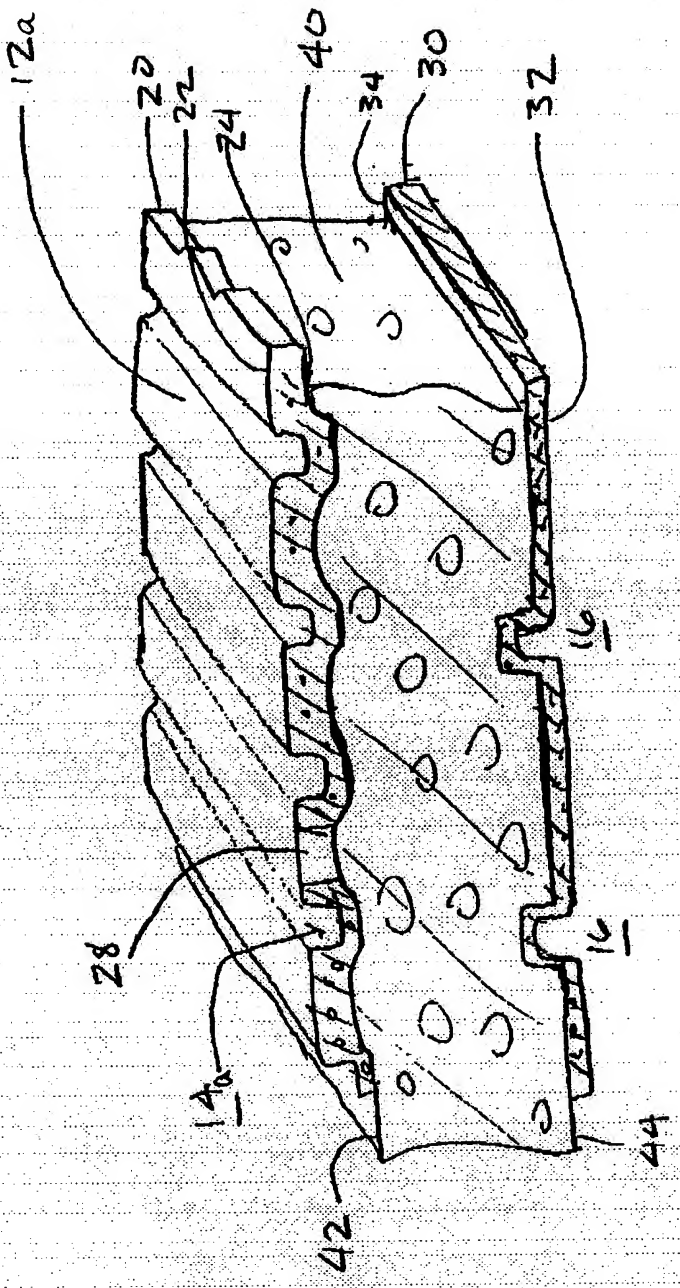
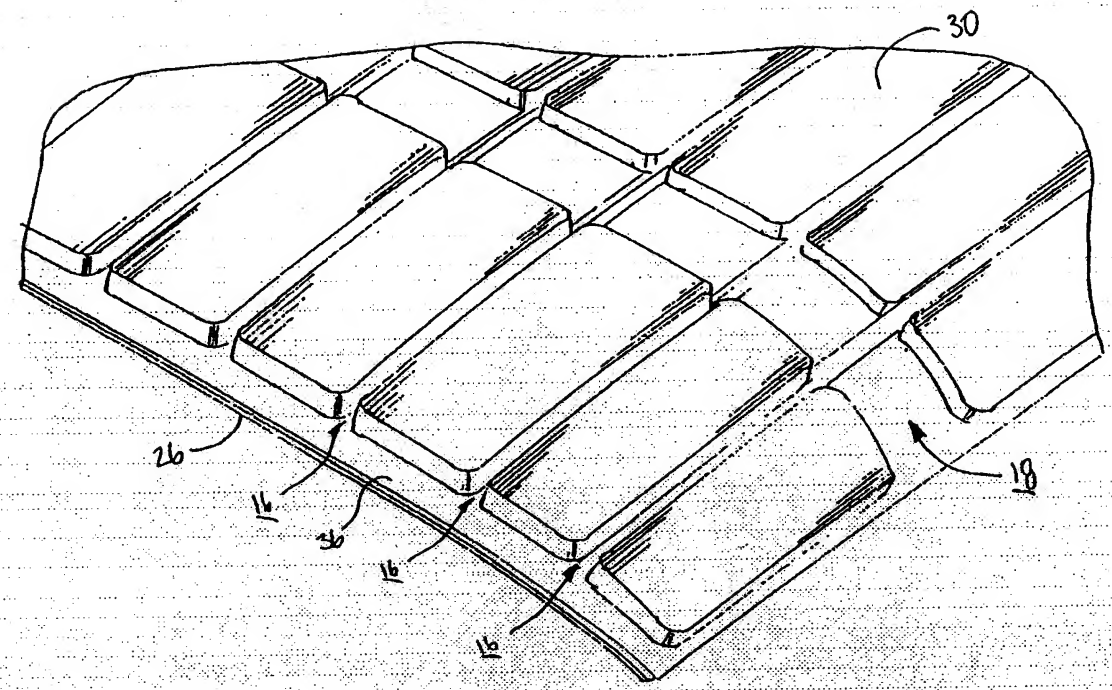


FIG 5a

FIG. 6



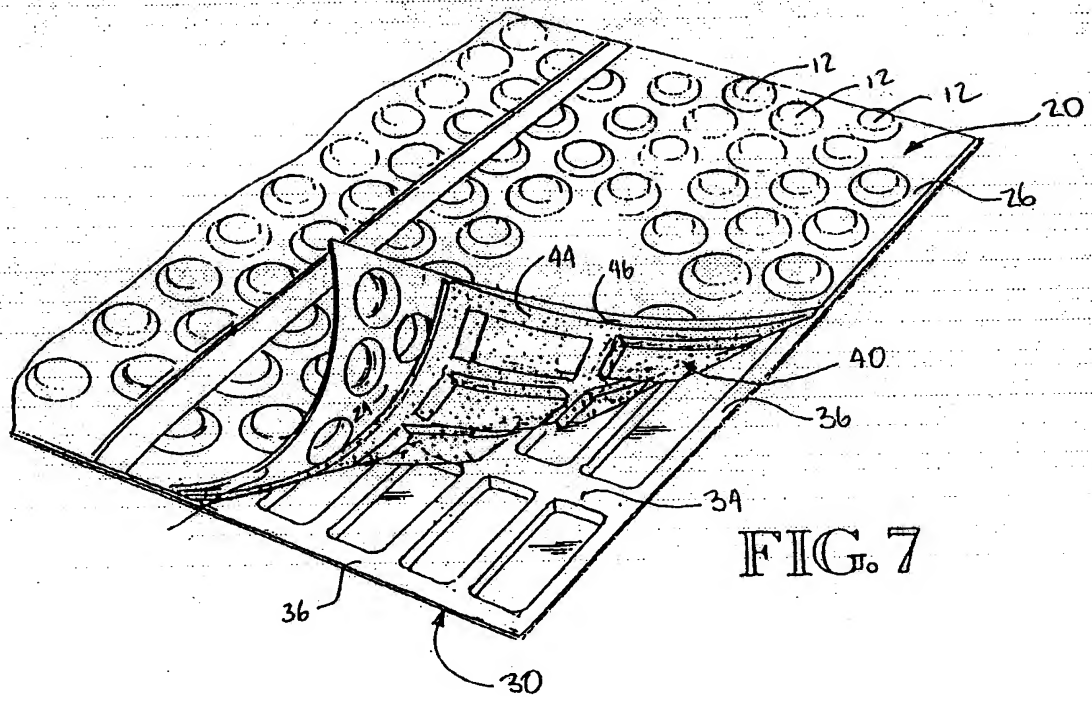


FIG. 7

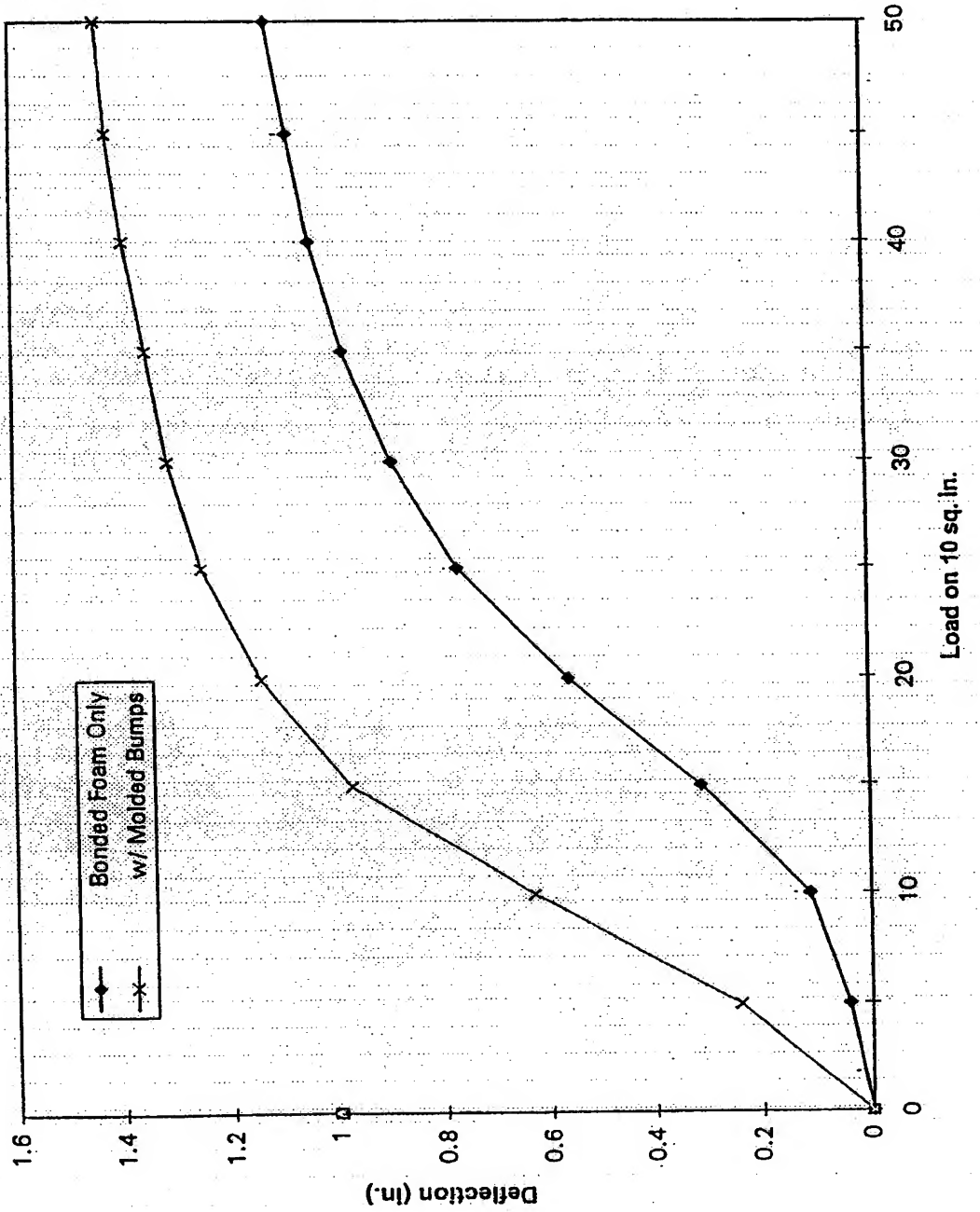
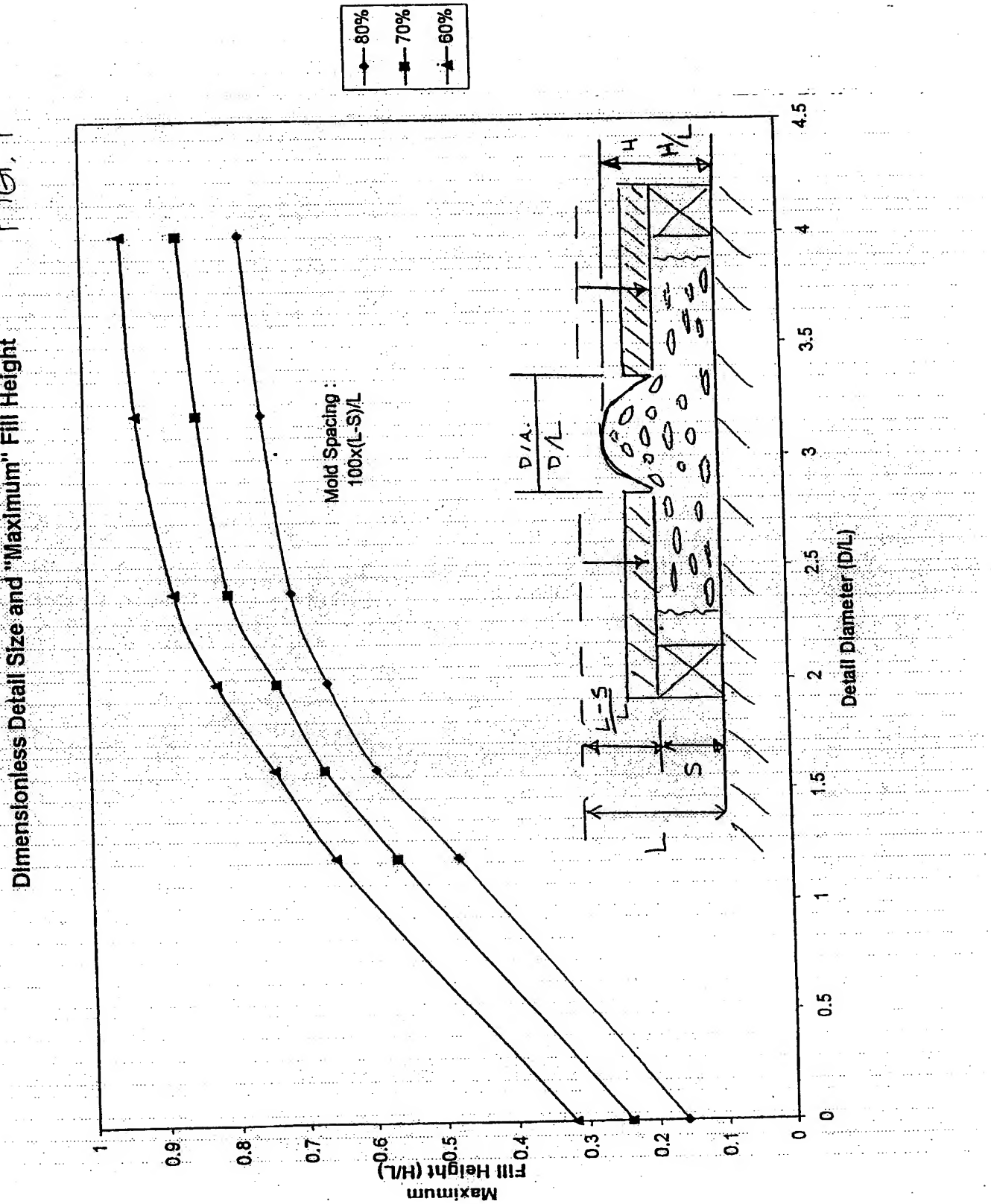

Deflection (In.)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Load on 10 sq. In.
0
10
20
30
40
50
Bonded Foam Only
w/ Molded Bumps

Fig. 9

FIG. 9


Dimensionless Detail Size and "Maximum" Fill Height
80%
70%
60%
Mold Spacing :
100x(L-S)/L
D/A.
D/L
H
H/L
L-S
S
L
Maximum
Fill Height (H/L)
Detail Diameter (D/L)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/12411

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :A47C 27/15; B32B 05/32
US CL :5/420, 709; 428/71, 159, 218, 314.4, 316.6

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 5/420, 709; 428/71, 159, 218, 314.4, 316.6

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and. where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y -- A	US 5,274,846 A (KOLSKY) 04 January 1994, see entire document.	1-7, 9-11, 16 --- 8 --- 12-15, 17-29
X -- Y -- A	US 4,624,877 A (LEA et al) 25 November 1986, see entire document.	1-8, 17-23 --- 9, 10, 24, 25 --- 11-16, 26-29

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:	
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"E" earlier document published on or after the international filing date	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"&" document member of the same patent family	

Date of the actual completion of the international search 05 JULY 2000	Date of mailing of the international search report 08 AUG 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer BLAINE R. COPENHEAVER DEBORAH THOMAS PARALEGAL SPECIALIST Telephone No. (703) 308-0661

Form PCT/ISA/210 (second sheet) (July 1998)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/12411

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,357,725 A (AHLM) 09 November 1982, see entire document.	1-8, 11, 16
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Y		9, 10
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A		12-15, 17-29
X	US 3,872,525 A (LEA et al) 25 March 1975, see entire document.	1-8, 17-23
--		----
Y		9, 10, 24, 25
--		----
A		11-16, 26-29